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EXPERIENCE OF SOVIET MEDICINE IN A GREAT PATRIOTIC WAR, 1941-19--ETC(U)

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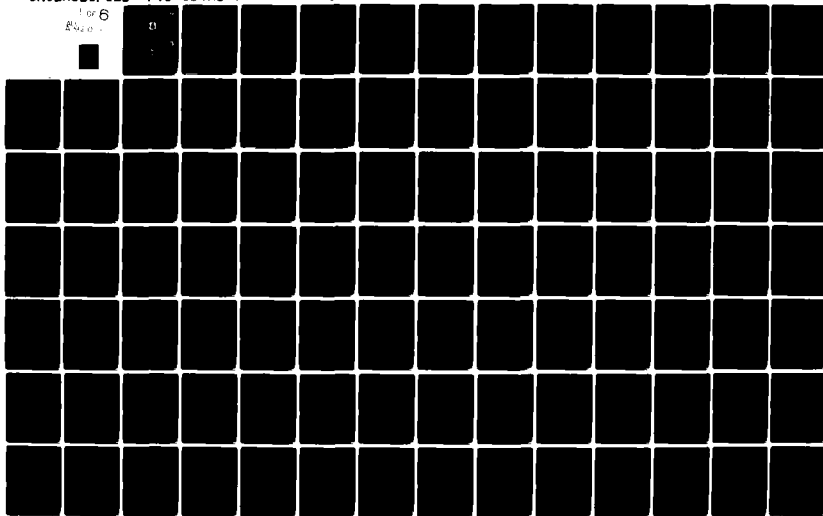
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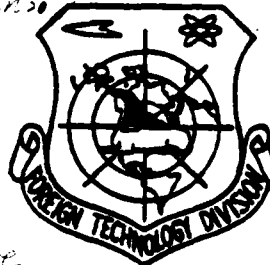
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disease/sickness/illness/malady, the crushed wounds, are more others which were undergoing massive contamination by anaerobic microbes and being for them a good medium, on the shin they were observed considerably more frequently than on other segments of the extremities (on the shoulder - 5.3o/o, on the forearm - 2.7o/o, on the thigh - 0.9o/o and on the shin - 8.3o/o).

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Table 87. Distribution of injured people with the bullet break of the bones of extremities, complicated by gas infection on the periods of its manifestation (in the percentages).

(2) Локализация перелома	(1) Сроки проявления инфекции (в сутках)		(3)					(4)		(5)		(6)	
	До суток		1	2	3	4	5	Всего	6-10	11 и более	Всего	Всего	Всего
(7) Плечо	0,2	10,7	19,3	19,3	19,3	11,8	80,6	16,2	3,2	100,0			
(8) Предплечье	—	3,0	10,4	13,4	20,9	6,0	53,7	38,8	7,5	100,0			
(9) Бедро	0,2	0,8	16,5	23,1	17,4	14,0	72,0	21,4	6,6	100,0			
(10) Голень	2,7	4,4	20,3	19,5	18,6	9,7	75,2	16,8	8,0	100,0			
(11) В среднем	1,3	4,5	17,2	19,5	18,6	10,9	72,0	22,3	5,7	100,0			

Key: (1). Period of the manifestation of infection (in the knocks).
 (2). Localization of break. (3). Up to days. (4). Altogether. (5).
 and more. (6). In all. (7). Shoulder. (8). Forearm. (9). Thigh. (10).
 Shin. (11). On the average.

Clinic (diagnosis).

The diagnosis of gas infection generally and with the bullet breaks in particular was based on the clinical symptoms.

On the frequency of the separate local symptoms of gas infection with the bullet breaks of the bones of extremities it is possible to judge by tables 88, the comprised according to the data author's development.

Table 88. Frequency of the local symptoms of the gas infection, which developed with the bullet breaks of the bones of extremities (in the percentages to a number of injured people with the gas infection).

(2) Симптомы	(1) Локализация перелома	(3) Плечо	(4) Пред- плечье	(5) Бедро	(6) Голень
(7) Боли		40,0	41,6	42,0	31,0
(8) Отек		80,7	86,6	66,0	71,0
(9) Выделение газа		30,0	30,0	24,0	25,0
(10) Специфический запах		50,6	40,0	36,0	45,0
(11) Специфические выделения		40,0	40,0	28,0	28,0
(12) Бледная кожа		30,0	35,0	22,0	23,0
(13) Пятна на коже		40,0	36,6	34,0	36,0
(14) Пузыри		16,0	16,6	4,0	10,0
(15) Крепитация		36,0	25,0	18,0	40,0
(16) Холодная конечность		20,0	18,3	8,0	25,0
(17) Напряжение тканей		17,0	20,0	16,0	12,0
(18) Изменение мышц		30,0	33,0	34,0	29,0
(19) Некроз в ране		18,0	56,6	16,0	26,0

Key: (1). Localization of break. (2). Symptoms. (3). Shoulder. (4). Forearm. (5). Thigh. (6). Shin. (7). Pains. (8). Edema. (9). Liberation of gas. (10). Specific odor. (11). Specific liberations/excretions. (12). Pale skin. (13). Maculae on skin. (14). Bubbles. (15). Crepitation. (16). Cold extremity. (17). Voltage of tissues. (18). Change in muscles. (19). Necrosis in wound.

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From Table 88 it is evident that among the diverse local symptoms there is not one, which would be encountered absolutely with all injuries, complicated by gas infection. Even such symptoms, as

pain and edema, which are considered pathognomonic for the gas infection, were observed hardly ever, especially during the development of gas infection on the lower extremity. The frequency of other local symptoms was also very different.

The stain/staining skin of the affected segments of extremities had diverse hues - pale, marble, gray, ash, pink, reddish, copper-colored, bronze, brown, yellow, violet, green, blue, purple and their different combinations. Different color and form/species there were the affected muscles - pale, the color of boiled beef or fish meat, gray, sulfur-green, brown, dark-brown, dark-red, purple, black, molten.

The discharge of wounds had frequently a specific sweetish-cloying odor or an odor of the turned sour cabbage, and according to the form/species it resembled meat slops or it was blood-containing, blood-containing-suppurative or suppurative.

Among the general/common/total symptoms it is possible to note mental excitation, increase in the temperature, low blood pressure, accelerated pulse. Temperature at the gas infection presented nothing characteristic; frequently it was moderately increased and in any way it did not reflect the severity of disease.

During the investigation of the blood almost always was noted the decrease of a quantity of erythrocytes, the incidence/drop in the percentage of hemoglobin in accordance with the severity of infection, increased ROE and small increase in the quantity of leukocytes. For the white blood more or less constant was the absence of eosinophils, neutrophilia with the left-shift due to the rod-shaped and young forms, the toxic grain size of neutrophils, lymphopenia, monocytes. In some injured people was observed sufficiently high leukocytosis. In many injured people with the complication of gas infection in the urine was detected the protein in the form of traces or in a larger quantity.

Thus, the diagnosis of the initial forms of gas infection was extremely hindered/hampered.

In the army and army region the bacteriological investigation of the discharge of wounds was conducted rarely. This was explained by the mainly fact that data of bacteriological study in many injured people could not solve doctor's doubts, but, furthermore, they were obtained so late, that no longer they were of practical use.

During the investigation of the discharge of the wounds, suspicious for the presence of gas infection, the anaerobes were sown in 90.00/o of injured people, and clinically gas infection became

apparent only in 25.0-30.0o/o. Completely nonindicative was determination in the discharge of wound B perfringens. Only during the detection in the discharge of wound B histolyticus the clinical manifestations of gas infection were developed almost always, and during detection B oedematiens - in 86.0o/o of injured people (A. N. Berkutov). It was difficult to establish/install connection/communication between the flora and the clinical picture. Are known the observations when an increase in the anaerobes during seeding/inoculation of the discharge of wounds it did not occur, but gas infection nevertheless was developed.

Sometimes was conducted the cytological investigation of the discharge of wounds, but its data were not reliable criterion with the diagnosis of gas infection.

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However, it is necessary to note that the results of bacteriological investigation in some injured people during the careful observation gave the possibility to diagnose the early forms of gas infection and to in proper time apply rational therapy. Great value bacteriological investigation acquired for the development/detection of the existing in the wound association of anaerobes and aerobes, that determined the course of process and the

use/application of therapeutic measures.

Although some authors consider that the x-ray examination to a considerable degree helps the early diagnosis of gas infection (according to Ya. B. Ryvlin's data, gas in the soft tissues it can be discovered in 80.70/o, and according to the data of D. V. Begak, even in 91.00/o of injured people), this method they put to use rarely. Meanwhile in some injured people the data of x-ray examination were the first signal about the beginning of the development of gas infection. Therefore to disregard roentgenological as well as bacteriological, by investigation does not follow. Sometimes they can prove to be very useful.

In accordance with the periods of the manifestation of gas infection with the bullet breaks of the bones of extremities its diagnosis was established/installed in the army and mainly in the army region (table 89).

Thus, in the army region gas infection was diagnosed in 1/5 parts of the injured people. In them most frequently was observed the heaviest course. Gas infection was diagnosed in the army region with the injury of thigh and forearm less frequent than with the breaks of the bones of shoulder and shin, which is connected with the fact that injured people with the break the thighs rapidly guided into the

specialized hospitals of army and front region, and with the break of the bones of forearm as relatively more than the lungs - into the army and front evacuation hospitals.

In 2/3 injured gas infection it was diagnosed in the army region, moreover almost identical frequently with respect to all segments of extremities.

Since later than the 10th day from the moment/torque of injury the gas infection more frequently became apparent on the forearm, the shin and the thigh (see Table 87), its diagnosis in the front region with the localization on these segments was established/installed respectively more frequently.

The diagnosis of gas infection in the field therapeutic institutions usually coincided with the time of its clinical exposure and, therefore, I could not be considered early.

Table 89. The distribution of injured people with the bullet break of the bones of extremities according to the regions of evacuations on which is established/installed the diagnosis of gas infection (in the percentages).

(2) Локализация перелома	(1) Район	(3) Воинско- вой	(4) Армей- ский	(5) Фронт- вой	(6) Тыловой	(7) Итого
(8) Плечо		25,5	68,3	5,7	0,5	100,0
(9) Предплечье		17,3	66,0	15,1	1,6	100,0
(10) Бедро		18,0	65,6	14,8	1,6	100,0
(11) Голень		24,7	64,3	10,4	0,6	100,0
(12) В среднем		21,7	65,4	11,9	1,0	100,0

Key: (1). Region. (2). Localization of break. (3). Troop. (4). Army. (5). Front. (6). Back. (7). Altogether. (8). Shoulder. (9). Forearm. (10). Thigh. (11). Shin. (12). On the average.

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A. M. Berkutov, who studied 1000 histories of the disease/sickness/illness/malady of injured people with the gas infection, established that these or other the symptoms of gas infection available in injured people already in 1-3 days before the development of its explicit clinical picture, when strictly and was placed the corresponding diagnosis. It goes without saying, it is difficult to require from doctors so that with the large overflow of

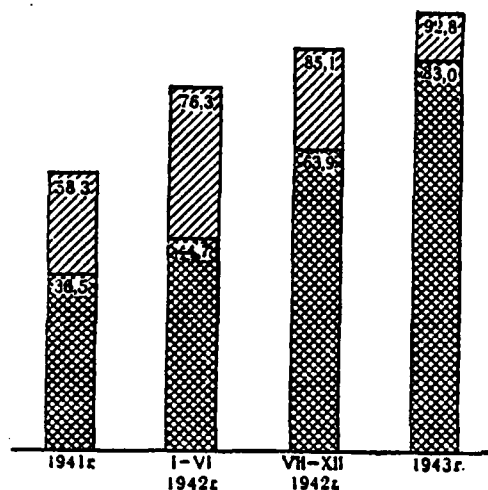
injured people they on the basis of any symptom (swelling, pains, etc.) could determine the incipient gas infection. However, it is necessary to note that the doctors of Soviet army during the war acquired large experiment/experience in the early diagnosis of gas infection. About this testifies the diagram in Fig. 28, where are shown the periods of the recognition of gas infection in different periods of war in the army and army region of one evacuation direction (it is comprised according to author's data).

If in 1941 gas infection was diagnosed during the first three days in 36.50/o of injured people in those stages where it became apparent, then into the first half of 1942 - already in 44.70/o, into the second half - in 63.90/o, in 1943 - in 83.00/o during the first five days it was diagnosed respectively in 58.3, 76.3, 85.1 and 92.80/o of injured people with the complication of gas infection.

Early diagnosis - guarantee of the successful treatment of gas infection. However despite the fact that already N. I. Pirogov in detail described gas infection with the bullet injuries of extremities, in the subsequent time its diagnosis was difficult, in the first place, because in the peaceful practice for doctors' majority rarely it was necessary to meet this complication of wounds; in the second place, because under field conditions the clinical manifestations of gas infection were extremely different. This

diversity was conditioned not so much on the presence in wound of the microbes of gas infection, as is very diverse by the association of them both between themselves and with the numerous aerobic microbes; in the pure form/species anaerobic microbes in the wound barely were encountered. Furthermore, the described by N. I. Pirogov clinical forms of gas infection presented the final stage of the development of gas infection, which very difficultly yields to treatment, and therefore their determination could not satisfy contemporary doctors. Although essence and symptoms of gas infection and measure of fight with this complication the doctors during the Great Patriotic War knew better than if that not was, its early diagnosis presented great difficulties and, as noted above, in the majority of injured people the establishment of the diagnosis of gas infection synchronized with its explicit clinical manifestation.

If was difficult the diagnosis of gas infection in the early stage of process, then the developing forms of gas infection were diagnosed hardly ever.



(1) В первые 5 дней { (2) В первые 3 дня

Fig. 28. Periods of the recognition of gas infection in the different periods of war.

Key: (1). During the first 5 days. (2). During first 3 days.

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Based on materials author's of the development of the histories of disease/sickness/illness/malady, gas infection it was not identified with the life in 4.30/o of injured people with the bullet break of the bones of extremities; with the breaks of shoulder - in by 4.00/o, that of the bones of forearm - in 2.20/o, thighs - in 7.00/o and the

bones of shin - in 2.6o/o of injured people. The clinical diagnosis of gas infection was not confirmed in the section in 13.6o/o of dead persons, moreover with the breaks of shoulder - in 19.7o/o of bones of forearm - in 16.6o/o, thighs - in 13.5o/o and the bones of shin - in 11.7o/o of dead persons.

Most frequently for the gas infection were accepted sepsis (48.6o/o), blood loss (20.3o/o) shock (9.5o/o), combination of these states (10.8o/o), large decomposition of extremities and pneumonia (10.8o/o).

Prophylaxis.

The development of gas infection determined in essence three facts: 1) the presence in wound of pathogenic microbes, 2) the presence of the large mass of the ischemic or necrotized musculature even 3) late surgical aid. Taking into account these facts was conducted prophylaxis of gas infection.

Even in the first world war for the purpose of prophylaxis was applied antigangrenous serum, which, in the opinion of many authors, yielded positive results in the sense of a reduction in the morbidity.

In the Great Patriotic War in accordance with instruction of the main military medical administration of the armed forces of the Union of SSR the preventive introduction of antigangrenous serum was necessary with the injuries with the large decomposition and sharp contamination of tissues. Despite the fact that the quality of antigangrenous serum was incomparably better than during the first world war, judge the effectiveness of its preventive introduction during the Great Patriotic War it is difficult. Surgeons' majority counts the preventive value of the antigangrenous serum of doubtful, in any case at those doses at which it was applied.

According to A. N. Berkutov's data, gas infection developed in 6.0o/o of injured people with the break of thigh, that obtained preventive antigangrenous serum simultaneously with the surgical processing of the wound (dissection and carving), and in 3.8o/o, those not obtained it. Some authors noted the effectiveness of the preventive introduction of antigangrenous serum (S. A. Aydinyan, Ye. M. Lebedev, N. Ye. Dudko), but only during the use/application of large doses or during the intravenous introduction (N. Ye. Dudko).

Based on materials of author's development, in the Great Patriotic War with the bullet breaks, which were complicated subsequently by gas infection, preventive antigangrenous serum was introduced to the half all injured people.

For the purpose of prophylaxis of gas infection during the Great Patriotic War were applied also anaerobic bacteriophages (intra-tissue injections, irrigation, humid bandages). According to the communication/report of some authors, they proved to be effective (P. M. Zhuravlev, G. A. Kokin).

However, general/common/total acknowledgement as the preventive substance against the gas infection anaerobic bacteriophages did not obtain.

The extensively used sulfanilamide preparations also did not safeguard from the development of gas infection.

The basic means of prophylaxis of gas infection was and remains timely first aid by injured person and timely and full-valued surgical processing of wounds.

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On the period of rendering of first aid from the moment/torque of injury with the bullet breaks, complicated by gas infection, it is possible to judge according to the data of Table 90.

If we consider timely first aid, given for the first three hours after injury, then it should be noted that to the suppressing number of injured people with bullet break (77.20/o) the complicated gas infection, first aid was shown/rendered in proper time. It is completely logical that the injured people with the break of the bones of upper extremity as more active and more mobile/motilely obtained by first aid earlier.

For quality coefficient of first aid had the value, who this aid rendered. Table 91, comprised based on materials of author's development, answers this question.

Thus, workers of medical service first aid was proved to be more than 75.00/o of injured people with the bullet break of the bones of extremities, which were complicated by gas infection.

Table 90. Periods of rendering of first aid by injured person with the bullet break of the bones of extremities, which were complicated by the gas infection (in the percentages).

(2) Локализация перелома	(1) Сроки оказания пер- вой помощи (в часах)		(3) и позднее		(4) Всего
	1	2-3			
(5) Плечо	70,0	11,2	18,8		100,0
(6) Предплечье	73,8	12,1	14,1		100,0
(7) Бедро	63,5	8,1	28,4		100,0
(8) Голень	68,7	9,7	21,6		100,0
(9) В среднем	67,6	9,6	22,8		100,0

Key: (1). Period of rendering of first aid (in the hours).. (2). Localization of break. (3). and late. (4). In all. (5). Shoulder. (6). Forearm. (7). Thigh. (8). Shin. (9). On the average.

Table 91. By whom proved to be the first aid by injured person with the bullet break of the bones of extremities, which were complicated by the gas infection (in the percentages).

(2) Локализация перелома	(1) Кем оказана первая помощь	(3) Самопо- мощь и взаим- помощь	(4) Санитар. санитар- ный ин- структор	(5) Фельд- шер, врач	(6) Итого
(7) Плечо		23,9	62,5	13,6	100,0
(8) Предплечье		30,4	55,1	14,5	100,0
(9) Бедро		15,5	68,0	16,5	100,0
(10) Голень		23,8	61,5	14,7	100,0
(11) В среднем		22,9	62,3	14,8	100,0

Key: (1). By whom is shown/rendered first aid. (2). Localization of break. (3). Self-help and mutual assistance. (4). Medical orderly, sanitary instructor. (5). Feldsher, doctor. (6). Altogether. (7). Shoulder. (8). Forearm. (9). Thigh. (10). Shin. (11). On the average.

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By auto- and mutual assistance was realized predominantly in the injured people who to a smaller degree lost their activity and mobility (with the injuries of shoulder, forearm, shin). With the injuries the thighs of auto- and by mutual assistance could put to use only 15.50/o of injured people.

The criterion of the quality of first aid with the bullet breaks

is transport immobilization - period of its use/application and quality. These data are represented in Table 92, the comprised according to the data deepened development of the histories of disease/sickness/illness/malady (period of use/application) and author's development (quality of immobilization).

Timely transport immobilization, therefore, it proved to be possible to carry out not for all injured with the bullet break of bones extremities, which were complicated by the gas infection (under the timely immobilization was understood the immobilization, which was being conducted for the first three hours after injury), moreover it is relatively more frequent on those segments of the extremities where its use/application is simpler and more available (forearm, shin).

As far as quality is concerned of primary transport immobilization, then full-valued immobilization occurred less than in the half injured people with the bullet break of the bones of extremity, which were complicated by gas infection. Under the full-valued immobilization was understood the use/application for the shoulder - the splint of Cramer, for the forearm - the splint of Cramer and gypsum splints, for the thigh - the Diedrichs' splint, for the shin - wire and gypsum splints and splints Thomas - Vinogradova.

As one would expect, different improvised splints more frequently were laid on those divisions of the extremities where to carry out them an immobilization was simpler and it is easier, i.e., first of all on the forearms.

Thus, in injured people with the gas infection frequently were observed defects in the transport immobilization and delay in its use/application, which, of course, contributed to the development of gas infection.

However, it should be noted that in injured people, who did not have gas infection, the timely transport immobilization was realized still less frequent, although its quality was somewhat better. Delay in the use/application of immobilization in the injured people of this group is explained by the fact that in them the incomplete breaks it was almost 3 times more than in Ruppe of injured people with the complication of the gas infection (table 93).

Table 92. Period of use/application and quality of transport immobilization with the complicated by gas infection bullet breaks of the bones of extremity (in the percentages).

(1) (2) Срок приме- нения (в ча- сах) Локализация перелома	(3) До часа	1-3	4-6	(4) 7 и позже	(5) Всего	(6) Качество транс- портной иммобилизации	
						(7) полно- ценная	(8) неполно- ценная
(9) Плечо	5,0	16,2	14,5	64,3	100,0	43,0	57,0
(10) Предплечье	7,8	23,6	14,3	54,3	100,0	35,2	64,8
(11) Бедро	8,0	10,8	12,0	89,2	100,0	47,5	52,5
(12) Голень	8,2	14,5	12,2	65,1	100,0	40,5	59,5
(13) В среднем	7,7	14,3	12,7	65,3	100,0	43,4	56,6

Key: (1). Period of use/application (in the hours). (2). Localization of break. (3). To hour. (4). and it is later. (5). In all. (6). Quality of transport immobilization. (7). full-valued. (8). defective. (9). Shoulder. (10). Forearm. (11). Thigh. (12). Shin. (13). On the average.

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The timely and full-valued primary surgical processing of wound, which eliminated substrate for reproducing the microbes of gas infection (ischemic and necrotized muscular tissue), was main substance in prophylaxis of gas infection (Table 94).

As can be seen from Table 94, the bullet breaks, which were complicated by gas infection, did not undergo primary surgical processing almost in 1/5 all injured people; timely surgical processing (to 12 hours after injury) was produced about 1/3 injured people; in the remaining injured people (68.10/o) primary surgical processing was realized within the later periods. Most frequently the late primary surgical processing was performed with the bullet breaks of thigh (71.60/o), shin (66.90/o) and shoulder (64.10/o), which is explained by the later delivery/procurement of heavily injured into the appropriate field therapeutic institutions (DMP and ^{Kh}PPG).

With the injuries with the break of the bones of extremities, which were not being accompanied by the complications of gas infection, primary surgical processing it did not undergo 1/3 injured people; for 6 hours primary surgical processing was produced in 18.90/o, for 12 hours - in 38.80/o of injured people.

Table 93. Distribution of injured people with the bullet break of the bones of extremities, complicated by gas infection and that not complicated by it, according to the form/species of break (in the percentages).

(1) Группа раненых с переломом	(2) Вид перелома				(7) Итого	(8) Вид перелома не установлен
	(3) дырчатый и краевой	(4) поперечный и продольный и косой	(5) раздробленный	(6) оскольчатый		
(9) Осложненным газовой инфекцией	6,2	9,9	46,5	37,4	100,0	47,0
(10) Не осложненным газовой инфекцией	17,6	16,1	16,6	49,7	100,0	22,9

Key: (1). Group of injured people with the break. (2). Form/species of break. (3). perforated and edge/boundary. (4). cross longitudinal and by scythe. (5). crushed. (6). fragmented. (7). Altogether. (8). Form/species of break is not established/installed. (9). By complicated gas infection. (10). By not complicated gas infection.

Table 94. Period of primary surgical processing with the bullet breaks of the bones of the extremities, which were complicated by the gas infection (in the percentages).

(1) Локализация перелома	(2) Сроки обработки (в часах)				(4) Итого	(5) Обработки не было
	6	7-12	13-24	(3) 25 и позднее		
(6) Плечо	17,0	18,9	31,1	33,0	100,0	21,6
(7) Предплечье	19,0	18,5	24,3	40,2	100,0	32,0
(8) Бедро	13,0	15,4	26,6	45,0	100,0	14,8
(9) Голень	15,3	17,8	34,7	32,2	100,0	17,1
(10) В среднем...	14,9	17,0	27,3	40,8	100,0	17,3

Key: (1). Localization of break. (2). Period of processing (in hours). (3). and late. (4). Altogether. (5). Processings it was not. (6). Shoulder. (7). Forearm. (8). Thigh. (9). Shin. (10). On the average.

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Since in injured people, who did not have gas infection, the perforated and edge/boundary breaks were encountered almost 3 times more frequent (see Table 93), then the primary surgical processing of wounds was performed in them almost 2 times less frequent than in injured people, who had the complication of gas infection.

In the group of the injured people in whom occurred gas

infection, breaks were much heavier than in injured people, who did not suffer gas infection. Hence it is possible to draw the conclusion that the delay with the processing, apparently contributed to the development of gas infection.

For warning/preventing the development of gas infection had a value not only the period, but also quality of finish (table 95).

As full-valued surgical processing (dissection with the carving, the dressing of vessels, the removal/distance of free bone scrap, processing of bone fragments, removal/distance of available foreign bodies) with the bullet breaks of the bones of the extremities, which were complicated by gas infection, should be recognized only that which is noted in 45.0c/o of injured people.

If we here connect amputations, then this numeral will increase to 59.8o/o. It should be noted that the injured people, who did not have gas infection, full-valued primary surgical processing underwent 49.2o/o. As a result of the considerable severity of the breaks in the group of the injured people, who had the gas infection (see Table 93), a number of those processed (59.8o/o) it full-valued proved to be insufficient in order to prevent the development of gas infection. Full-valued primary surgical processing (without the amputation) was performed most rarely on the shin where the complex

anatomical-topographical relations sometimes impeded the effects/actions of the young surgeons.

Amputations during the primary surgical processing most frequently were conducted on shin (19.3o/o), on shoulder (18.5o/o) and on forearm (11.9o/o). This is explained by the fact that upon the considerable decomposition of shoulder and shin the doctors, fearing the possibility of the development of infection and its transition to the overlying divisions, more easily were solved for the amputation, than with the breaks of thigh. Furthermore, as has already been indicated, the part of the injured people with the considerable decomposition of thigh perished to the operation/process as a result of the shock and the blood loss.

In the relation to forearm surgeon's tactics was more cautious, since there was a time and a possibility to produce the high amputation of shoulder.

Table 95. Character/nature of primary surgical processing in injured people with the bullet break of the bones of extremities, complicated by the gas infection (in the percentages).

(1) (2) Характер обработки Локализация перелома	(3) Ампутации	(4) Расчленение с иссечением и другими элементами обработки	(5) Только рас- сечение	(6) Итого
(7) Плечо	18,5	50,2	31,3	100,0
(8) Предплечье	11,9	46,8	41,3	100,0
(9) Бедро	9,2	46,1	44,7	100,0
(10) Голень	19,3	42,1	38,6	100,0
(11) В среднем	14,8	45,0	40,2	100,0

Key: (1). Character/nature of processing. (2). Localization of break. (3). Amputation. (4). Dissection with carving and other elements of processing. (5). only dissection. (6). Altogether. (7). Shoulder. (8). Forearm. (9). Thigh. (10). Shin. (11). On the average.

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If the presence of a large quantity of ischemic or necrotized muscular tissue in the bullet wound was the basic factor, which contributed to the development of gas infection, then during the primary surgical processing the radical carving of the killed or gloomy to the death muscular tissue was considered necessary: during the damage of main-line vessels the muscles, deprived of blood supply for 6-8 hours, undergo numbness.

In injured people with the break of bones and the damage of vessels gas infection was developed considerably more frequent (to 2 times and more), than in injured people without the damage of vessels; in this case it was established/installed, that in the development of gas infection it did not have vital importance, was conducted the dressing of vessels during the primary processing or it was not conducted.

Removal/distance during the primary surgical processing of foreign bodies as the permanent foci of infection (experiment/experience of Soviet medicine in the Great Patriotic War, Vol. 15, pg. 95) also can characterize the full value of primary surgical processing. In this respect are not deprived of interest following data (Table 96).

Consequently, with the bullet breaks, which were complicated by gas infection, during the primary surgical processing were driven out $1/5$ part of all foreign bodies, with the subsequent operations/processes approximately/exemplarily the same quantity. Thus, $3/5$ foreign bodies remained uneliminated/unremoved and we could serve as the sources of gas infection. This assumption will become especially convincing, if one takes into account, that in injured

people, who did not have the complication of gas infection, it was not removed only 1/3 jammed in the tissues metallic foreign bodies.

Most rarely were driven out foreign bodies during the primary surgical processing not forearm (15.60/o) and with the subsequent operations/processes with the bullet breaks of the bones of shin (16.00/o). Complex anatomical-topographical relations on the forearm and the shin, apparently, impeded the extraction of foreign bodies.

Table 96. Extraction of foreign bodies with the bullet breaks of the bones of the extremities, which were complicated by the gas infection (in the percentages).

(1) Локализация перелома	(2) Момент удаления инород- ных тел		(5) Всего удалено	(6) Не удалено
	(3) при первич- ной хирур- гической обработке	(4) при после- дующих операциях		
(7) Плечо	18,6	23,0	41,6	58,4
(8) Предплечье	15,6	28,0	43,6	56,4
(9) Бедро	25,8	19,9	45,7	54,3
(10) Голень	19,2	16,0	35,2	64,8
(11) В среднем	21,7	19,1	40,8	59,2

Key: (1). Localization of break. (2). Moment/torque of removal/distance of foreign bodies. (3). during primary surgical processing. (4). With subsequent operations/processes. (5). In all it is removed. (6). Not removed. (7). Shoulder. (8). Forearm. (9). Thigh. (10). Shin. (11). On the average.

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From entire that presented it follows that connection/communication between the development of gas infection with the bullet breaks and the period and the quality of primary surgical processing is doubtless. However, timely, and the so-called full-valued primary surgical processing always did not prevent the

development of gas infection. This once more indicates that the development of gas infection in the bullet wound is conditioned on on any factor, and by their combination.

Treatment.

The treatment of injured people with the complication of gas infection in the army and army region presented in the first world war far not easy problem. These difficulties were noted also during the Great Patriotic War.

However, the medical service of Soviet army overcame by their creation in each field therapeutic institution of the special anaerobic separations/sections, which had available the permanent staff of the personnel of all categories, by its surgical dressing-operating, by their own equipment and by materials.

It is remarkable, that already N. I. Pirogov expressed and put into practice idea about the need organizing the special separations/sections for the "infected" injured people: "Special separation/section for those infected, as I him understand, there is a genus of quarantine, and is strict the performance of quarantine measures only and possibly in the special, isolated and removed from the main hospital houses. Is it possible, in fact, without the

special room, the special doctors and the servants and without especially strict discipline to guarantee, that such energy measures ... will be completed in the accuracy and without the exceptions/eliminations:.. Now I am the defender of the arrangement/position of injured people between the healthy/sound ones, so I the enemy of the arrangement/position of those infected between others, those not subjected another contamination by patients".

Anaerobic separations/sections played large role in an improvement in the quality of the treatment of injured people with the complication of gas infection and in a reduction in the lethality, and their value constantly grew/rose in proportion to gaining of experience and improvement in the entire organization of this matter. Are very exponential in this respect the data about the results of the treatment of gas infection in different periods of war in one of the anaerobic separations/sections of army region (according to the personal observations of the author) (table 97).

Table 97. Results of the treatment of the injuries of extremities with the break of bones and without their break, complicated by gas infection, in the anaerobic separation/section of hospital in the different periods of war on one of the fronts.

(1) Период войны	(2) Число ран. лиц с газовой инф. мимей (абсолютные числа)	(3) Исток (в процен- тах)		
		(4) ампути- ровано	(5) умерло	(6) эвакуи- ровано
(7) Январь—апрель 1942 г. . .	111	37,0	30,0	33,0
(8) Май—декабрь 1942 г. . . .	158	28,8	22,6	48,6
(9) Январь—ноябрь 1943 г. . .	72	23,6	7,0	69,4

Key: (1). Period of war. (2). Number of injured people with gas infection (absolute numbers). (3). Issue (in percentages). (4). it is amputated. (5). died. (6). evacuated. (7). January-April of 1942. (8). May- December of 1942. (9). January-November 1943.

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The experiment/experience of the Great Patriotic War showed that, since entire process of the treatment of injured people with the complication of anaerobic infection was very work consuming, the results of treatment were found in direct dependence on loading of the anaerobic separations/sections: after the large admission of injured people it deteriorated, during the normal loading they were improved.

In accordance with the etiology and the pathogenesis the treatment of gas infection proceeded from the account of its form and stage of process and consisted in the immediate elimination of the focus of infection and all moments/torques, which contributed to the development of gas infection, in the gap of the association of microbes and in the fight with the intoxication. This was reached by the complex method of the treatment elements/cells of which were surgical measures, serous therapy and nonspecific treatment.

The basic element/cell of complex therapy was the surgical treatment, directed toward the elimination of the focus of infection and which consisted of the wide dissection of wound and the carving of the affected tissues or of the amputation of extremity on one or the other level.

Table 98 gives representation about the character/nature of primary surgical interventions apropos of gas infection, which were being applied with the bullet breaks of the bones of the extremities, complicated by the gas infection (according to the data of author's development).

As can be seen from Table 98, dissection and carving as first

surgical intervention more frequently were applied during the gas infection, which developed on forearm (53.00/o) and on the thigh (40.50/o), less frequent, but approximately/exemplarily equally frequently (37.7 and 36.60/o) on the shin and the shoulder. The fear of the possibility of the propagation of infection to the thigh and the chest forced surgeons more frequently to resort to the amputation with the complicated by gas infection bullet breaks of the bones of shin (58.80/o) and shoulder (48.40/o). As far as breaks are concerned complicated by gas infection of thigh and bones of forearm, then with them primary amputations were conducted considerably less frequent.

It is necessary to note that in 1/4 injured people after dissections in view of the propagation of infection it was necessary to resort to the amputation, moreover during the gas infection, which developed with the bullet breaks of shoulder - in 14.70/o, the bones of forearm - 21.60/o, thigh - in 24.50/o, the bones of shin - in 37.20/o of injured people. Attention is drawn to the fact that approximately 1/6 injured people with the bullet break of thigh, which were complicated by gas infection, it did not undergo operation/process due to the severity of state, but all injured people with the complicated gas infection by the break of shoulder were operated.

Table 98. Character/nature of primary surgical interventions with the bullet breaks of the bones of the extremities, complicated by the gas infection (in the percentages).

(2) Локализация перелома	(1) Характер оперативного вмешательства	(3)	(4)	(5)	(6)
		Рассече- ние и ис- сечение	Ампута- ция	Экзарти- куляция	Не опе- рировано
(7) Плечо		38,6	48,4	15,0	0,0
(8) Предплечье		53,0	42,8	1,4	2,8
(9) Бедро		40,5	39,7	3,3	16,5
(10) Голень		37,7	58,8	0,9	2,6
(11) В среднем		40,9	47,7	5,0	6,4

Key: (1). Character/nature of surgical intervention. (2).

Localization of break. (3). Dissection and carving. (4). Amputation.

(5). Exarticulation. (6). not operated. (7). Shoulder. (8). Forearm.

(9). Thigh. (10). Shin. (11). On the average.

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During the rapid propagation of infectious process to the front/leading abdominal wall and into the abdominal space and with the sharp intoxication of injured person the surgeons, naturally, rarely resorted during the gas infection of thigh to to such heavy for the patient and technically difficult for the vicinal surgeon operation/process as exarticulation of extremity.

On the contrary, to exarticulation more frequently they resorted with the complicated by gas infection breaks of shoulder. 'exarticulation of upper extremity as less difficult technically operation/process it was more easily transferred by injured people and many of them it saved life. Therefore exarticulation of upper extremity apropos of gas infection it was conducted 4 times more frequently than by lower.

After the primary operation/process, produced apropos of the identified gas infection, many injured people underwent even and repeated operational intervention, which were being undertaken both for further fight with the gas infection and with its consequences

Table 99, comprised according to the data of the deepened development of the histories of disease/sickness/illness/malady).

From Table 99 it is evident that a great number of injured people (62.00/o) with the bullet break, which were complicated by gas infection, was operated in the army and army region, i.e., where became apparent in main gas infection, moreover operations/processes were directed toward the liquidation of infectious focus (revision of wound, amputation).

Table 99. Nature of repeated or surgical interventions in the different stages of evacuation in injured people with the bullet break of the bones of extremities, complicated by the gas infection (in the percentages).

(A) Локализация перелома	(B) Характер опера- тивного вмеша- тельства		(C) Удаление инородных тел и кост- ных отломков	(D) Ревизию ран и вскрытие флегмон	(E) Перевязка сосудов	(F) Удаление септестров	(G) Ампутации	(H) Ремптации	(I) Прочие опе- рации	(J) Всего	(K) Не опериро- вано
	(L) Войсковой и армейский район										
(1) Плечо	4,7	44,8	—	—	—	44,9	—	5,6	100,0	53,0	
(2) Предплечье	2,5	40,8	0,8	—	—	54,2	—	1,7	100,0	35,1	
(3) Бедро	3,3	40,0	2,0	—	—	51,3	—	3,4	100,0	42,3	
(4) Голень	2,3	26,3	0,8	0,4	—	65,7	1,6	2,9	100,0	30,0	
(5) В среднем	2,9	34,3	1,1	0,2	—	57,5	0,7	3,3	100,0	38,0	
(M) Фронтальной район											
(1) Плечо	—	29,2	3,1	25,0	25,0	3,1	15,6	100,0	83,2		
(2) Предплечье	4,4	35,6	8,9	11,1	33,3	—	6,7	100,0	72,6		
(3) Бедро	10,2	27,2	4,1	6,1	40,2	3,4	8,8	100,0	60,6		
(4) Голень	1,6	13,2	2,3	1,6	26,8	8,5	46,0	100,0	55,0		
(5) В среднем	4,4	20,6	3,5	5,4	31,4	5,8	28,9	100,0	63,0		
(N) Тыловой район											
(1) Плечо	9,3	7,4	—	53,7	—	16,6	13,0	100,0	70,2		
(2) Предплечье	10,2	10,3	2,5	43,6	5,1	7,7	20,6	100,0	75,8		
(3) Бедро	1,8	9,1	—	23,0	8,5	41,2	16,4	100,0	47,3		
(4) Голень	0,7	2,8	—	17,8	3,1	54,3	21,3	100,0	47,6		
(5) В среднем	2,5	5,7	0,2	24,8	4,6	43,3	18,9	100,0	54,7		

Key: (a). Localization of break. (b). Character/nature of surgical intervention. (c). Removal/distance of foreign bodies and bone scrap. (d). Revision of wounds and autopsy of phlegmons. (e). binding of vessels. (f). Removal/distance of sequestrations. (g). Amputation. (h). reamputation. (i). Other operations/processes. (j). In all. (k).

it is not operated. (1). Army and army region. (1). Shoulder. (2). Forearm. (3). Thigh. (4). Shin. (5). on the average. (m). Front region. (n). Back region.

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In the front region the operated injured people composed approximately/exemplarily 1/3 (37.0o/o), and the target of operations/processes was also the liquidation of infectious focus (autopsy of phlegmons, amputation). In the administrative area a number of those operated again heaves (45.3o/o), but operations/processes were already directed mainly toward the fight with the consequences of the gas infection (removal/distance of sequestrations in 24.8o/o, reamputation - in 43.3o/o).

Bulk of amputations apropos of gas infection with the bullet breaks was produced in the army and army region - 82.9o/o, in the front - 14.7o/o and only 2.4o/o in the administrative area. in the latter/last two regions the amputations were connected mainly with the consequences of gas infection (osteomyelitis, sepsis, pyaemia). It is completely logical that reamputations in essence about were used up in the administrative area. These data are represented in Table 100.

Besides the wide dissections and the carvings, and also the amputations, in some injured with the complication bullet breaks of gas infection were applied the so-called cross barrier sections/cuts on the overlying healthy/sound segment of extremities. But, as a rule, these cuts did not stop the development of gas infection, and, after all, it was necessary to resort to the amputation. From these barrier sections/cuts surgeons' majority refused, since in the recovered injured people remained the sharp disturbances/breakdowns of the function of extremity, which made the latter of unsuitable for the use.

A question about the readings to one or the other form/species of surgical treatment during the gas infection in the first world war actually was not solved, and many surgeons inflowed into extremes. Some of them proposed to produce either only sections/cuts or carving of whole muscular groups, others only advisable substance considered amputation in the healthy/sound limits of extremity.

Some surgeons recommended multiple small ones, others - wide sections/cuts, and the third - to the longitudinal sections connected cross ones.

Table 100. The distribution of injured people with the bullet break of the bones of extremities, complicated by gas infection, according to the regions, in which by it were produced the amputations and reamputation (in percent).

(1) Локализация перелома	(2) Район, где производилась ампутация			(6) Итого	(7) Район, где производилась реампутация			(8) Итого
	(3) войско- вой и армей- ский	(4) фрон- товой	(5) тыло- вой		(3) войско- вой и армей- ский	(4) фрон- товой	(5) тыло- вой	
(8) Плечо	94,2	5,8	—	100,0	—	10,0	90,0	100,0
(9) Предплечье	78,4	19,4	2,2	100,0	50,0	—	50,0	100,0
(10) Бедро	76,0	19,4	4,6	100,0	—	6,8	93,2	100,0
(11) Голень	84,7	13,5	1,8	100,0	3,8	9,1	87,1	100,0
(12) В среднем	82,9	14,7	2,4	100,0	3,6	8,4	88,0	100,0

Key: (1). Localization of break. (2). Region where was conducted amputation. (3). Army and army. (4). front. (5). back. (6). Altogether. (7). Region where it was conducted reamputation. (8). Shoulder. (9). Forearm. (10). Thigh. (11). Shin. (12). On the average.

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In the Second World War and in the Soviet army, and in the foreign armies a question about the readings to the operations/processes, in particular, to the amputation, also presented for the doctors great difficulties. However, contemporary doctors, possessing more intimate knowledge about the blood supply of

the separate muscular groups of extremities, with the larger confidence stopped on one or the other means of surgical intervention, taking into account moreover, the degree of intoxication and the general state of that wounded. In any case it is necessary to keep in mind that when, on one or the other segment, the extremity of two exsanguinated groups of muscles is present, is shown the amputation. During the damage to the radial and ulnar artery of lower than the anastomoses the forearm greatly frequently is deprived of blood circulation and is subject to early amputation.

The first symptoms of the gas infection, discovered after the dressing of the main vessels of shin, always was reading for the amputation. The injury of front/leading tibial artery in the sense of the development of gas infection was more riskily than the injury of posterior tibial artery.

By especially risky ones were represented injuries in the lower division of the shin, when on the same side was conducted the dressing of femoral artery. In such injured people even with suspicion of the gas infection it was shown amputation.

The appearance of symptoms of gas infection upon all extensive decomposition of bones and with the implication of large/coarse joints always especially entailed early amputation.

Being based on the analysis of the materials of the Great Patriotic War, Soviet surgeons' majority at present is inclined in favor of larger radicalism during the surgical treatment of gas infection - in the early amputation they see singularly reliable substance for the rescuing of the life of injured person.

In the relation to the method of amputations it is necessary to note that if into the first half war predominated the truncation of extremities using the circular method, frequently with the additional dissection of stump, then into the second half the war surgeons put to use the flap methods which gave the best subsequent results and in no way complicated the courses of disease/sickness/illness/malady and did not raise lethality. As a rule, amputations were conducted without the tourniquet. The use/application of the latter in the majority of injured people led to flare up of gas infection on the cult.

During the surgical treatment of gas infection the high value had the selection of method and substances of anesthetization, since the injured people were in the state of severe intoxication. However, after the Great Patriotic War this question remained unresolved. Table 101 gives representation about which anesthetization was applied during the surgical treatment of the complicated by gas infection breaks (based on materials of author's development).

Table 101. Form/species and substance of anesthetization during the surgical treatment of gas infection, which complicated the bullet breaks of the bones of extremities (in the percentages).

(1) Локализация перелома	(2) Вид и средство обезболивания	(3) Общее			(4) Местное	(5) Итого
		(6) хлорэтил	(7) эфир	(8) гексенал внутривенно	(9) новокаин	
(10) Плечо		31,3	64,2	—	4,5	100,0
(11) Предплечье		20,0	80,0	6,7	13,3	100,0
(12) Бедро		43,2	47,0	1,2	8,6	100,0
(13) Голень		35,8	51,9	1,2	11,1	100,0
(14) В среднем		33,0	56,0	2,0	9,0	100,0

Key: (1). Localization of break. (2). Form/species and means of anesthetization. (3). General/common/total. (4). ethyl chloride. (5). ether/ester. (6). hexenal it is intravenous. (7). local. (8). novocaine. (9). Altogether. (10). Shoulder. (11). forearm. (12). Thigh. (13). Shin. (14). On the average.

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By the basic form/species of anesthetization was, thus, general/common/total (by ethyl chloride or by ether/ester). Local anesthetization was applied mainly during the gas infection, which developed on the forearm and the shin, in the form of the so-called case anesthesia of the overlying segment within the limits of healthy/sound tissues. Some authors, retorting to the local anesthetization, they indicated the development of gas infection in

the cult after the use/application case anesthesia. the use/application of hexenal as the substance, which reduces blood pressure, must be considered counter-indicative.

To the second of element of the complex therapy of gas infection, which developed after bullet breaks, was serous treatment specific antigangrene sera.

Antigangrene sera were applied even in the first world war; however, the specific opinion about their effectiveness then it was not formed. Some authors gave the convincing data about a reduction in the lethality from the gas infection during the use/application of a serum, others counted its effectiveness of doubtful, and the third - by simply problematic.

Such a different relation to the serous therapy could occur mainly because the quality of serum in the first world war was not only low, but also different in the different countries. The experimental works, which were being conducted with the improved sera after the first world war (L. A. Chernyy, A. V. Ponomarev, G. M. Davidov, L. M. Shcherbinina et al.), with no doubt demonstrated the effectiveness antigangrene serum; therefore serous therapy extensively was used in the Great Patriotic War.

However, all surgeons refer to that opinion that the treatment by serum must not be contradicted to surgical treatment, it is only auxiliary method.

The Great Patriotic War made possible to check the effectiveness of serous therapy on a large number of injured people with the complication of gas infection. Thus, for instance, according to the data of A. N. Barkutov, who observed 1000 injured people with the gas infection by which applied a sufficient quantity of antigangrene serum, and 767 injured people, by which it they did not introduce at all or was introduced an insufficient quantity, lethality in the first group into 1 1/2 and the more of times was less than the secondly, although in the latter other conditions for the treatment were better. Analogous data give other Soviet and foreign authors. But nevertheless and at present some consider that the value of serous therapy is not yet explained.

The experiment/experience of the Great Patriotic War showed that the previous method of the introduction of the antigangrene serum (is subcutaneous and intramuscularly) it actually/really proved to be barely effective; therefore wide acceptance obtained the intravenous method of its introduction.

According to the investigations by L. A. Chernyy, during the

intravenous introduction of serum is necessary small concentration to the blood is achieved immediately, while by intramuscular introduction only after 48-72 hours. The concentration of serum during the intravenous introduction is 3-4 times higher than with the intramuscular, and 10 times it is higher than with the subcutaneous.

For the intravenous introduction authors' majority preferred the dilute (1:10) in the physiological solution serum and the drop method of introduction as barely given large reactions and complications. Some authors (N. Ye. Dudko) of publicized intravenous injection of the massive doses of serum without the breeding/culture/dilution, but with this method more frequently were observed heavy reactions and unforeseen complications (anaphylactic shock).

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Were propositions to introduce antigangrene serum and it is intra-arterial. Thus, about intra-arterial introduction of serum 85 to injured person, not accompanied by any complications, reported S. A. Aydinyan, also, about 150 injured people - S. G. Turovets (with one fatal result from the collapse). This method of general/common/total acknowledgement did not obtain. Many surgeons even from it cautioned.

According to Ya. M. Lebedevoy's data, during the intravenous introduction of antigangrene serum the lethality among the injured people with the complication of gas infection was equal to 20.2o/o, during the intramuscular introduction - 61.9o/o, and with that combined - 17.9o/o.

Some foreign authors [A. Leven (A Lowen)] to avoid complications during the intravenous introduction of serum proposed to introduce it together with calcium chloride.

The experiment/experience of the Great Patriotic War showed also that for increase in the effectiveness of serous treatment it is necessary to introduce large doses of serum - from 50000 to 150000 AE.

With the complicated by gas infection bullet breaks serous therapy was applied in 54.0o/o of injured people (according to the data of authors development), moreover with the breaks of shoulder - in 59.1o/o, the bones of forearm - in 47.1o/o, thighs - in 48.3o/o and the bones of shin - in 60.0o/o.

Thus, serum therapy with the bullet breaks, complicated by gas infection, was applied by a little more than in the half all injured people (54.0o/o) and most frequently during the gas infection, which

developed on the shoulder and the shin.

In the Great Patriotic War during the treatment of gas infection were applied also specific and nonspecific bacteriophages. Then especially propagandized P. M. Zhuravlev. Bacteriophages were applied both locally in the form of intra-tissue injections, irrigation and humid bandages and it is intramuscular and it is intravenous. Were propositions (I. A. Shumilin) introduce bacteriophages and it is intra-arterial. On the effectiveness of the bacteriophages of unanimous opinion it was not created. While some authors (I. B. Oleshkevich, A. N. L'vov, P. M. Zhuravlev, V. I. Kolesov, G. A. Kokin et al.) saw in them effective substance for the treatment of the gas infection (in I. B. Oleshkevich during the use/application of a bacteriophage together with the surgical treatment lethality during the gas infection composed 14.20/o, and without the bacteriophage - 19.40/o), others (A. F. Lepukaln) was considered bacteriophage only supplementary substance to the serum treatment - after the neutralization of the toxins of bacterium they more easily underwent dissolution. The interesting data about the effectiveness of bacteriophages gave A. N. Berkutov. In the first period of the use/application of a bacteriophage (in 500 injured people with the gas infection) in it was created very good impression about this preparation (lethality during the use/application of a bacteriophage - 26.00/o, without it - 32.00/o); however, during further

observations began disappointment - the lysing effect of phages sharply was lowered.

This phenomenon A. N. Berkutov was explained by the fact that the prepared in the laboratories bacteriophage proved to be ineffective with respect to the wound microbes.

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However there it was, wide acceptance in the Great Patriotic War bacteriophages did not receive, about which tell, in particular, and the forthcoming data about the frequency of the use/application of a bacteriophage with the complicated by gas infection bullet breaks (based on materials of author's development). The frequency of the use/application of bacteriophages during the treatment of those complicated by the gas infection of the bullet breaks of shoulder composed 10.7o/o, the bones of forearm - 7.1o/o, thigh - 7.4 o/o, the bones of shin - 6.6o/o, on all segments - 8.0o/o.

As the nonspecific therapy during the gas infection, together with the surgical methods and the sera, extensively were used different chemical substances. The target of their use/application - to act on aerobic flora and thereby to tear the microbial association which very frequently and determined the severity of gas infection.

From the old substances in the Great Patriotic War was applied peroxide of hydrogen and potassium permanganate as strong oxidizers and tender substances for the mechanical cleansing of wounds; the chlorine-bearing preparations (chloramine, azochloramine, chloracid, neopantocid, etc.), Rivanol, ichthyol, boric acid, and also ointment of A. V. Viwnyovskiy, waste crankcase oil (OKM), etc. But especially wide distribution received sulfanilamide preparations - streptocide, sulfidine, sulfazole, sulfathiazole, etc. both for the local use/application (dusting, ointments, emulsions) and for the general/common/total (per os is intravenous). According to the data of almost all authors, during the treatment of gas infection sulfanilamide preparations exerted the favorable effect/action on the course of infectious process. The greatest effect gave sulfathiazole and sulfidiazine, in view of which the individual authors called their medicine of selection. Some surgeons during the treatment of gas infection introduced sulfanilamides intra-arterial. Thus, for instance, G. T. Vlasov 22 by injured person with the expressed gas infection introduced intra-arterial 10o/o solution/opening of sulfidine and lost only one injured person; to one injured person he produced the amputation of extremity. A good effect from the use/application of sulfanilamides was explained by their effect/action not only on streptococcus, diplococcus and other

aerobic microbes, but also it is direct on anaerobes.

In last year of war in the Soviet army during the gas infection was applied penicillin. A comparatively small number of observations does not make it possible to give the proper estimation to this preparation during the treatment of gas infection. However, according to Soviet and foreign authors' data, the effectiveness of this antibiotic is doubtless.

There are all foundations for considering that the antibiotics will play the leading role during the treatment of gas infection.

A. N. Barkutov reported 30 injured people whose gas infection they treated by the pressing of oxygen into the muscles of the affected extremity. Positive results it is not obtained. Some foreign authors counted oxygen therapy of effective in combination with the serotherapy.

Among the nonspecific methods of the treatment of gas infection visible place occupied the blood transfusion whose beneficial effect/action noted the Soviet and foreign authors.

According to the data of the development of histories of disease/sickness/illness/malady, the blood transfusion was applied in

3/4 injured people with the bullet break, complicated by gas infection, moreover predominantly by the break, which were complicated by gas infection, moreover predominantly were transfused small doses (200.0-250.0). In the number of produced transfusions the injured people were distributed as follows: one transfusion the blood obtained 38.30/o of injured people, two transfusions - 24.30/o, three transfusions - 13.90/o, four transfusions - 8.30/o, five transfusions - 5.80/o, six transfusions - 4.00/o seven and more - 5.40/o.

As reading for the transfusion the blood served shock and blood loss in 8.00/o, gas infection - in 51.30/o, sepsis - in 2.30/o, secondary sepsis - in 4.40/o, secondary anemia - in 7.50/o, the combined readings - in 26.50/o of injured people.

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During the gas infection put to use also physical therapy methods the treatments (ultraviolet lighting). According to B. M. Broderzon's data, under the influence of physical therapy substances was suppressed the vital activity of streptococci, descended the virulence of anaerobes and were mobilized local elements of reticulo-endothelial system.

On the use/application of X-rays for the treatment of gas

infection from the Soviet authors during the Great Patriotic War communicated only S. A. Aydinian. In the foreign authors was also the very restrained relation to the X-ray therapy.

High value acquired during the treatment of gas infection the ideal immobilization of the affected extremity, but its realization, it is completely logically, it presented considerable difficulties, especially in the army and in the near army region. As a rule, at the erosion/climax of infectious process were applied predominantly they were standard splints or gypsum casts. with the abatement of phenomena large success was obtained with the application of anechoic or fenestrated gypsum dressing. At the value of the ideal immobilization with the complicated breaks indicated already N. I. Pirogov: "For me unthinkable saving treatment without the immobility of the ends of the break, and therefore contraindication to the application of motionless dressing I consider one secondary sharp/acute stress/voltage alone when it is found in the full/total/complete erosion/climax".

It is completely logical that if with the uncomplicated bullet break the imposition of anechoic gypsum bandage required from the surgeon of the very strict estimation both of local and general/common/total symptoms, then is especially necessary was necessary their estimation with the bullet breaks, complicated by gas

infection. The outbreak of gas infection under the anechoic gypsum bandage although it is rare, it was observed. Based on materials of author's development, on the shoulder the outbreak was noted in 1.00/o of injured people, on the forearm - in 1.40/o, on the thigh - in 5.30/o, on the shin - in 3.30/o, on all segments on the average - in 3.20/o of injured people.

According to the data of A. N. of L'vov, anechoic gypsum bandage it was superimposed by 41.00/o of injured people with the complication of gas infection, moreover in them secondary hemorrhages, septic complications and pneumonia were observed more rarely. The imposition of anechoic gypsum bandage A. N. L'vov produced in the early stage of gas infection, with the violently current forms and in the stage of the abatement of the phenomena of gas infection; necessary conditions in this case was the full/total/complete surgical processing of wound with the removal/distance of metallic foreign bodies.

For the successful treatment of gas infection high value had the organization of care and nourishment. The frequent exchange of bed and next to the skin linen, careful and sparing care the regulation of water-salt metabolism/exchange, permanent observation of diuresis, abundant introduction of fluids/liquids, in particular, the solutions/openings of glucose (intensive combustion of

carbohydrates), giving of oxygen (oxygen starvation) significantly influenced, together with the basic methods of treatment, the course of infectious process. The nourishment of injured people with the complication of gas infection was conducted frequently, food was given high-energy, vitaminized (giving of vitamins was necessary) and easily digested.

Should be recalled N. I. Pirogov's statements about the organization of feeding of the injured people, who have different complications, in particular, gas infection. Thus its remarkable words in regard to this: "As soon as patient obtained aversion from the food, then by no scientific reasons you will constrain it to eat...

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But almost all injured in Crimean war, without the exception/elimination, pill with the large enjoyment tea, on several/somewhat beakers during the day, although many of them never its not drunk before. This instinctive urge to warm, a somewhat feed, slightly stimulating and sudorific drinking was for me more significant than all theoretical considerations about the content of injured people". and further: "here are my rules. Not to tie to the injured person of food by force and not to leave ever a feeling of

hunger not satisfied. Not to deduct urge to the food by artificial abstention and dieting, but to maintain with its digestible and feed food. Not suddenly and not to too change usual food to the stomach, trained to the dense and abundant food or to the alcohol beverages, not to reject unconditionally either the meat or the fruit even and the period of traumatic reaction".

"By strict hospital diet, assigned without the selection/analysis by all injured person, it is possible in all to repulse latter/last appetite to the food... Therefore I tried to support between the injured people into Crimea the use of tea, giving him and with the milk, and with the roll and finding that it for the sick, devoid appetite and lying into the heat, is incomparably more useful and more pleasant than all French tisan, German gäfertum and our hospital oat pulp and barley concoctions. But as soon, and in whatever that the period of injury was, showed urge to the food, I immediately tried to satisfy by his feed food, but not to eliminate by inappropriate abstention and artificial diet".

These words, aforesaid of one hundred years ago, did not lose their value and now. True there was N. I. Pirogov and when he said that the scientific prejudices so with difficulty are eradicated as people.

In summing up everything said about the treatment of injured people with the complication of gas infection, it is necessary to draw the conclusion that it required complex and sharp organization and was very work consuming. To what extent was ideal this organization, to that degree was determined the success of treatment.

The severity of course of gas infection with the bullet breaks was in full/total/complete agreement with the volume of the affected segment of extremity. This is very is distinctly evident during the comparison of the average periods of the duration of intoxication in the survived injured people with the bullet break, complicated by gas infection. With the complicated by gas infection breaks of shoulder this period was equal to 11 days, the bones of forearm - 7-8, thighs - 15 and the bones of shin - 12 to days.

On the severity of the course of gas infection with the bullet breaks gives representation and duration of the hospital treatment injured, subsequently killed, and injured of those recovered (table 102 and 103).

Table 102. Duration of the hospital treatment of injured people with the bullet break of the bones of extremities, dead persons from the gas infection (in the days).

(1) Локализация перелома	(2) Длительность лечения	(3) Наимень- шее число дней	(4) Наиболь- шее число дней	(5) Среднее число дней
(6) Плечо		2	18	8
(7) Предплечье		2	35	10
(8) Бедро		1	112	6
(9) Голень		1	20	8

Key: (1). Localization of break. (2). Duration of treatment. (3). small number of days. (4). great number of days. (5). Average number of days. (6). Shoulder. (7). Forearm. (8). Thigh. (9). shin.

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According to the data of the development of the histories of disease/sickness/illness/malady, the average duration of the hospital treatment of all injured people with the bullet break was such (in the days): shoulder - 135, forearm - 108, thigh - 183, shin - 168. Thus, as a result of the gas infection treatment was involved/tightened for the period from 6 (shoulder) to 47 days (thigh). This fact, as it will be evidently further, was reflected also in issues.

Most frequent complications in injured people with the bullet break, that transferred gas infection, are represented in Table 104. data of table 104 are in full/total/complete agreement with the character/nature of primary surgical interventions, which were being conducted apropos of the developing gas infection (see Table 98).

Most frequently the complications of osteomyelitis were observed with the breaks of the bones of forearm and thigh, since the preserved extremities it was most of all with the breaks of the bones of these segments (see Table 98). Pathological stump on the lower extremities was encountered into two and the more of times more frequently, on the upper ones; therefore that to the cult of lower extremities were presented higher requirements. Early amputations and exarticulation apropos of gas infection with the bullet breaks of the bones of shoulder, forearm and shin not created conditions for the development of sepsis, which especially relates to the forearm and the shin when amputation was conducted on the overlying segment in the limits relative to healthy/sound tissues.

Table 103. Duration of the hospital treatment of the recovered injured with the bullet break of bones extremities, complicated by the gas infection (in the days).

(1) Локализация перелома	(2) Длительность лечения	(3) Наимень- шее число дней	(4) Наиболь- шее число дней	(5) Среднее число дней
(6) Плечо		58	318	141
(7) Предплечье		38	297	119
(8) Бедро		80	633	230
(9) Голень		75	481	208

Key: (1). Localization of break. (2). Duration of treatment. (3). small number of days. (4). great number of days. (5). Average number of days. (6). Shoulder. (7). Forearm. (8). Thigh. (9). Shin.

Table 104. Frequency of late complications in injured people with the bullet break of the bones of extremities, which transferred the gas infection (in the percentages to a number of those remaining in the living ones).

(1) Локализация перелома	(2) Осложнение	(3) Остео- миелит	(4) Патоло- гическая культи	(5) Вяло текущий сепсис
(6) Плечо		19,0	19,5	1,1
(7) Предплечье		21,7	15,5	—
(8) Бедро		19,4	35,8	2,6
(9) Голень		3,7	48,0	0,2

Key: (1). Localization of break. (2). Complication. (3). Osteomyelitis. (4). pathological stump. (5). Limply flowing sepsis. (6). Shoulder. (7). Forearm. (8). Thigh. (9). Shin.

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During the estimation of the organization of the treatment of injured people with the complication of gas infection doubtless interest are of the data about a quantity of those passed by the injured people of the stages of evacuation (Table 105).

From Table 105 it is evident that the injured people with the complication of gas infection, as a rule, underwent treatment only in those stages of the evacuation where in this there was need, and they

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were, therefore, they were released of the excess traumatization during the transportation, which was quite significant for the issues.

Table 105. Quantity of stages, passed by injured people with the bullet break of the bones of extremities (on the average).

(1) Локализация перелома	(2) Группа раненых	(3) Все ране- ные (по данным разработкой истории болезни)	(4) Раненые имевшие осложнение газовой инфекцией (авторская разработка)
(5) Плечо		5,2	5,3
(6) Предплечье		4,8	4,8
(7) Бедро		5,4	5,7
(8) Голень		5,3	6,0

Key: (1). Localization of break. (2). Group of injured people. (3). All injured people (according to data of development of histories of disease/sickness/illness/malady). (4). Injured had complication of gas infection (author's development). (5). Shoulder. (6). Forearm. (7). Thigh. (8). Shin.

Issues.

Lethality during the gas infection in the first world war was very high in the armies of all belligerent countries. On the official reports, in the American army the lethality was equal to 44.0-48.00/o, in the French army - 57.80/o, in the German army - 50.0-60.00/o and in English - 22.00/o. In this case it is necessary to note that these data relate to all injuries, which were complicated by gas infection, but not to the bullet breaks.

Low lethality in the English army the German researchers [K. Franz (C. Franz)] took in the doubt.

the individual authors communicated higher numerals of the lethality: Zudek (Zudek) - 85.00/o, Frenkel (Frenkel) - 75.00/o, Duhamel (Duamel) - 70.00/o, a. p. of Crimea - 67.00/o, A. D. Pavlovsky - 60.60/o, N. N. Burdenko - 60.00/o.

According to the data of the development of the histories of disease/sickness/illness/malady, in the Great Patriotic War the lethality with the bullet breaks, complicated by gas infection, was equal to 31.40/o but on the separate segments of extremities, and also during the different years of war, as can be seen from table 106, it considerably oscillated.

Consequently, in the Great Patriotic War lethality during the gas infection considerably was lowered, especially if one takes into account, that given data relate to the heaviest injuries (with the damage of bones), complicated by gas infection.

Completely is understandable that the highest lethality was observed with complicated by gas infection the breaks of thigh (51.10/o), on other segments it was considerably below and was located in the dependence on the volume of the segment of extremity.

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The lowest lethality was observed with the complicated by gas infection breaks of the bones of forearm (13.0o/o). If we examine lethality during the gas infection on the shin and the forearm separately upon decomposition of both bones or any one bone, then are obtained somewhat different given: with breaks of both bones of forearm the lethality composed 15.4o/o, radial - 2.8o/o, cubital - 12.1o/o, both bones of shin 22.8o/o, tibia - 18.5o/o, fibular - 21.0o/o.

Consequently, lethality, just as development and course of gas infection, is found in the dependence on character/nature and degree of the decomposition of bones. This, it would seem, contradict to a certain degree the data about the lethality with the bullet breaks of the bones of shin, since upon the decomposition of less powerful/thick fibular bone the lethality was even above (21.0o/o), than with the breaks of tibia (18.5o/o).

But it is here necessary to consider specific anatomical-topographical relations on the shin, which, as is known, from all sides it is dressed as the dense aponeurosis, soldered with

anterointernal than the side with the periosteum along the entire face of the tibia. By the going from the internal surface of the aponeurosis extensions and interosseal diaphragm shin shares into two completely isolated divisions - front/leading and posterior. With the bullet breaks of the fibular bone is widely revealed the front/leading division of shin; in this case very frequently the fine/small fragments of the wounding projectile or bone scrap, piercing the partition/septum between the fibular and posterior muscles of shin, fall into the posterior division of shin and there, being located almost in the closed cavity, are foci infections. This fact during the primary surgical processing of wounds on the shin requires from the surgeon of considerable attention. The careful processing of the wounds of shin taking into account the topography of the latter allowed some surgeons to attain a considerable reduction in the complications of gas infection with the injuries of shin.

Thus, in the Great Patriotic War lethality with the bullet breaks of thigh, complicated by gas infection, remained most high.

Table 106. Lethality with the bullet breaks of the bones of the extremities, complicated by gas infection, during the different years of war (in the percentages).

(1) Локализация перелома	(2) Год					(3) За все годы в среднем
	1941	1942	1943	1944	1945	
(4) Плечо	20,0	17,8	29,5	14,7	17,4	21,1
(5) Предплечье	5,9	14,3	20,0	5,2	11,5	13,0
(6) Бедро	35,8	47,0	51,0	57,0	55,0	51,1
(7) Голень	24,0	29,2	21,4	17,7	16,4	22,1
(8) В среднем	26,2	32,0	33,1	30,8	31,0	31,4

Key: (1). Localization of break. (2). Year. (3). In all years on the average. (4). Shoulder. (5). Forearm. (6). Thigh. (7). Shin. (8). On the average.

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However, the issues of the injuries of thigh, complicated by gas infection, were considerably more advantageous, than in the first world war in which, according to foreign authors' data, the lethality during the gas infection of thigh reached 80.00/o and even 100.00/o, in spite of the extensively used amputations.

The medical service of Soviet army, after creating the ordered organization of aid by injured person with the complication of gas

infection, attained in the Great Patriotic War of the specific successes in the treatment of this terrible complication of bullet wounds.

Gas sepsis in injured people with the bullet break of the bones of extremities, complicated by gas infection, based on materials of the author's development of the histories of disease/sickness/illness/malady, was observed rarely: with the breaks of shoulder in 1.30/o of injured by, that bones of forearm - in 0.50/o, thighs - in 3.30/o and the bones of shin - in 0.40/o.

Occuring more frequent and within the earlier periods primary amputations during the gas infection, which developed after the bullet breaks of the bones of shoulder, forearms and shins, apparently, and explain the low percentage of gas sepsis.

Final clinical issues in injured people with the bullet break, that transferred gas infection, are represented in Table 107.

From the data of Table. 107 follow that only in the insignificant part of the injured people (1.90/o) with the bullet break, that transferred gas infection. completely was reduced ability to work; all remaining were after extraction from the hospital the invalids of different degree. However, it is necessary to note that

subsequently, because of reconstructive interventions which extensively were used in disabled war veterans in the specially created hospitals, to majority of them was in full or in part returned ability to work.

Table 107. Clinical issues in the transferred gas infection injured people with the bullet break of the bones of extremities (in the percentages to a number of recovered injured people).

(1) Локализация перелома	(2) Клинический исход		(3) Хорошо	(4) Последствия повреждения нервов	(5) Контрактура	(6) Анкилоз	(7) Ложный сустав	(8) Остеомиелит	(9) Кухля		(10) Комбинация этих исходов	(11) Прочие исходы	(12) Итого
	(10) хорошо	(11) плохо											
(15) Плечо	2,8	6,1	13,4	1,7	1,7	8,0	52,2	8,0	3,3	2,8	100,0		
(16) Предплечье	1,9	5,6	22,0	5,6	3,1	3,8	38,4	14,0	5,0	0,6	100,0		
(17) Бедро	1,7	1,4	21,2	5,2	—	4,1	51,4	9,2	3,4	2,4	100,0		
(18) Голень	1,7	3,2	9,8	1,1	1,1	6,0	66,9	7,0	1,7	1,5	100,0		
(19) В среднем	1,9	3,5	15,0	2,8	1,2	5,5	56,8	8,7	2,8	1,8	100,0		

Кэу: (1). Localization of break. (2). Clinical issue. (3). Good. (4). Consequences of damage of nerves. (5). Contracture. (6). Ankylosis. (7). False joint. (8). Osteomyelitis. (9). Stump. (10). good. (11). poor. (12). Combination of these orig. (13). Other issues. (14). Altogether. (15). Shoulder. (16). Forearm. (17). Thigh. (18). Shin. (19). On the average.

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TETANUS WITH THE BULLET BREAKS OF THE BONES OF EXTREMITIES.

To the Great Patriotic War a question about the complication of the bullet breaks of long tubular bones of tetanus neither in the official reports of all armies nor in the medical literature

specially was lit. meanwhile this question had the high value during the study, since, as this will be evidently from the subsequent presentation and by analogy with gas infection, the complications of tetanus more frequently appeared precisely during the bullet damages, which were being accompanied by the decomposition of bone.

According to the data of the development of the histories of disease/sickness/illness/malady, in the Great Patriotic War tetanus was developed in injured people with the bullet break of long tubular bones almost 2 times more frequent (0.13o/o) than during the damages only of soft tissues of extremities (0.07o/o), moreover with the bullet break of shoulder - in 0.17o/o of injured people, bones of forearm - in 0.07o/o, thighs - in 0.16o/o and the bones of shin - in 0.17o/o.

With the bullet breaks on the lower extremity tetanus was developed 1 1/2 times more frequently (0.16o/o) than on upper extremity (0.1o/o).

During the separate years of war the frequency of the complications of the bullet breaks of tetanus had considerable oscillations, namely: in 1941 - 0.2o/o, in 1942 - 0.1o/o, in 1943 - 0.13o/o, in 1944 - 0.08o/o and in 1945 - 0.24o/o.

Almost 4/5 all complications of tetanus after the bullet breaks of the bones of extremities were recorded in the spring and autumnal months.

Like gas infection, tetanus more frequently it was developed with the injuries where it is more than disastrously soft tissues both from the direct effect of quite bullet projectile and from the fragments of the destroyed bones.

Therefore after fragmentation injuries tetanus was developed 5 times more frequently than after bullet ones (0.25-0.05o/o). In accordance with this blind-end injuries with the damage of long tubular bones were complicated by tetanus 6 times (0.36o/o), and injuries of pulverization of bones 4 times (0.25o/o) are more frequently than through (0.06o/o).

The damages of large/coarse arterial vessels, which lead to an even larger death of muscular tissue, were noted in 1/5 all injured with the bullet break long tubular bones, which were complicated by tetanus.

The duration of incubation period with the complication of tetanus varied from 3 to 93 days, moreover about the half all complications it appeared into the first ten days after injury, one

third - for a period of 11-20 days after injury, and remaining - within the later periods.

It is important to note that in injured people, dead persons from tetanus, which developed with the bullet breaks, the latter predominantly became apparent during the first ten days after injury, and in those recovered, on the contrary, within the later periods. The most prolonged incubation period in injured people, who was killed from tetanus, was equal to 14 days.

In accordance with the duration of incubation period tetanus with the bullet breaks of the bones of extremities became apparent predominantly in the army and front region.

Before authors' majority it asserted that the longer the way which must make tetanus toxin, is the longer incubation period. However, this opinion, disproved even before the war F. S. Korganovoy-Mueller was not confirmed by observations in the Great Patriotic War. Incubation period with tetanus, which developed after the bullet break of the bones of shin, by its duration does not differ from incubation period during the development of tetanus after the bullet break of shoulder.

The diagnosis of tetanus, as a rule, did not present for the doctors of the field service of special difficulties, and usually the original symptoms of this complication were caught in proper time and immediately they were undertaken the corresponding therapeutic and organizational measures. In this respect the matter was considerably better than during the recognition of the initial forms of gas infection.

The earliest symptoms of tetanus with the bullet breaks in the majority of injured people were the suddenly begun difficulties with ingestion and opening of mouth, of the pulling pains in the joints lower jaws, pain with the ingestion, difficulty of respiration, inaudible speech. Already for the first hours after the appearance of these symptoms was developed trismus of masticatory musculature and almost full/total/complete impossibility of the opening of mouth, spasm of mimic musculature with the characteristic expression of those (risus sardnicus), who pull pains in the occiput and in entire spine (rigidity of postcranial and back muscles), who converted/transferred into the spasms of neck and back muscles (opisthotonus). Gradually spasms seized the new groups of muscles, being discharged downward, and finally they began in entire body. force and duration of spasms sharply oscillated - then they were

especially not strong and lasting, then, on the contrary, they lasted for long and they were sharply pronounced. In some injured spasms appeared periodically several times in the day, in other attacks/seizures/paroxysms of spasms they followed through the short gaps/intervals (into several minutes) - one after another, sharply weakening/attenuating patients. In the part of the injured people the first symptoms of beginning tetanus were the pains and the stress/voltage of stomach, accompany by the absence of appetite and by liquid chair/stool. Injured people sometimes presented the first complaints. to the constraint in the breast and the pain during the respiration, cough and impossibility to clear the throat. Soon to these phenomena were connected the stress/voltage of the muscles of breast, difficulty with the opening of mouth and the ingestion, trismus of masticatory and mimic musculature and spasm of different groups of muscles. Frequently the attacks/seizures/paroxysms of cough were accompanied by the convulsive twitchings of lower and upper extremities. In the rare injured people the first signs of tetanus were the pains, and also packing/seal and stress/voltage of tissues in the damaged extremity; then through the short time interval was developed the full/total/complete picture of tetanus.

Spasms in injured people carried the character/nature of clonic ones or epileptoid, they were accompanied by strong sweating and headache. Sometimes spasms for the first time began in the region of

the damaged extremity and gradually seized the new groups of muscles.

Almost in all injured people was observed the dryness of tongue, frequency increase and weakening of pulse, and during the development of disease/sickness/illness/malady - yellowishness of scleras. Always it was possible to determine the clonus of feet and stifles. During the attack/seizure/paroxysm of spasms sometimes were noted the occlusions of tongue, and after attack/seizure/paroxysm was developed strong weakness. Temperature of the body not reflected the severity of the course of the process: in some injured people even with the expressed phenomena of tetanus it remained normal to death itself or it was subfebrile, in others, on the contrary, it heaved to the high numerals and was explained most frequently by the presence simultaneously of another infection, predominantly rotting. The consciousness of injured people always remained clear. In the lungs, as a rule, it was determined the weakened respiration and dry wheezes. The tones of heart were pure/clean.

In the urine in all injured people was noted the presence of protein, leukocytes and lixiviated erythrocytes. In the blood, as a rule, considerably was decreased a percentage of hemoglobin and a quantity of erythrocytes. A quantity of leukocytes was raised to 15000-18000; ROE reached to 65 mm an hour; it was observed lymphopenia.

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In those injured people, in whom was investigated the cerebro-spinal fluid, in it it was determined protein, cytolysis, positive reactions to the precipitation of globulin of Nonne-Apelte and Pandy; during seeding/inoculation of cerebro-spinal fluid of an increase in the microbes never it was noted.

In the small part of the injured people, predominantly with the damage of lower extremities, phenomenon of tetanus they were expressed only in the convulsive twitchings of the muscles of injured extremity in the absence of any overall phenomena - so-called local tetanus.

Any external stimulation usually caused the attack/seizure/paroxysm of the general/common/total or restricted spasms. Death most frequently began during attack of shuddering with the phenomena of the spasm of diaphragm/midriff and depletion of heart activity.

It is necessary to have in mind that the initial symptoms of tetanus as headache and the rigidity of postcranial muscles, could

sometimes simulate developing meningitis. Thus, for instance, in injured k. during several days neuropathologists were inclined to the diagnosis of meningitis, and only the begun then spasms and the spasm of masticatory and mimic muscles, and late other manifestations of tetanus solved doubts.

According to the duration of incubation period tetanus, which was being developed with the bullet breaks, they divided into the sharp/acute, subacute and chronic form, while according to the clinical course - into the violently flowed/occurred/lasted and moderately flowed/occurred/lasted form.

The violently flowed/occurred/lasted forms of tetanus were noted in 1/6 parts of those sickened. In one injured person was observed the outbreak of tetanus afterward, it would seem, full/total/complete recovery.

Prophylaxis of tetanus generally, and with bullet fractures in particular in the Great Patriotic War was realized, proceeding pi of the understanding of etiology and pathogenesis of this complication. Besides the presence in wound of the corresponding pathogenic microbes, the development of tetanus influenced, as noted above, the presence of the large mass of the ischemic and necrotized muscular tissue.

Despite the fact that personnel of Soviet army in proper time underwent general active immunization by antitetanus anatoxin, in the foremost stages of evacuation by all injured person, as a rule, had to be introduced antitetanus serum (1500-3000 AE).

According to the data of the development of the histories of disease/sickness/illness/malady, with the bullet breaks of the bones of the extremities, which were complicated by tetanus, antitetanus serum for the preventive target was introduced in the foremost stages and in proper time in $3/4$ injured people, but in $1/4$ injured people it was not introduced.

These data seemingly testify about the doubtful value of the preventive introduction of antitetanus serum. However, in the examination separately of the group of dead persons and group of recovered from tetanus injured people it was possible to note that in the first group the antitetanus serum was applied only in the half injured people, and in the group of those recovered - it is more than in $4/5$ injured people. Nevertheless there is no doubt that the timely and sufficient introduction of antitetanus serum always could not prevent the development of tetanus. This bears out the fact that in the development of tetanus it played role not one, but many factors,

first of all the state of wound itself and organism. Therefore, together with the serum, in prophylaxis of tetanus considerable attention was paid to the timely and full-valued first medical and surgical aid by injured person.

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First aid was shown/rendered by all injured person the bullet break, which were complicated by tetanus, moreover it is more than 2/3 injured people in proper time, i.e., for the first three hours after injury (to majority of injured people immediately after injury), and by remaining within the later periods. More than the half injured people first aid obtained by way of auto- and mutual assistance (dressing by first aid kit, sometimes simplest of immobilization), remaining injured person aid rendered the persons of medical service.

These data, it would seem, also tell about the fact that the rendering of first aid had no value for prophylaxis of tetanus. But during the comparison of the group of dead persons from tetanus and group of the recovered injured people it was possible to note that in proper time the aid was shown/rendered that almost all subsequently recovered and only to the half injured people, subsequently perishing from tetanus; in this case to the first group of injured people first aid she more frequently proved to be by the persons of the medical service, and the second to group - by way of auto- and mutual

assistance.

Frequently the reason for the development of tetanus were the uneliminated/unremoved foreign metal bodies or the pieces of outfit and foot-wear. The study of the histories of the disease/sickness/illness/malady of injured people with the bullet break, which were complicated by tetanus, showed also that in all injured people to the time the detection of the first symptoms of tetanus of wound was covered with necrotic coating and they separated/liberated badly reeking pus, and in some were the expressed phenomena of rotting infection. It is hence necessary to draw the conclusion that the rotting microbes created very favorable medium for the development of tetanus. By onset in the wound of rotting infection, apparently, it is necessary to explain that the fact that the timely and full-valued primary surgical processing/treatment did not safeguard some injured people from the disease by tetanus.

The value of the rotting infection of wound for the development of tetanus illustrates the following observation.

M., 30 years it is injured 24/XI 1941 by the explosive bullet. Perforating bullet injury of upper third of right shoulder with the breaking up of bone. First aid is shown/rendered on the field of battle by way of mutual assistance. Wound surgical

processing/treatment did not undergo. 27/XI injured person entered in EG. it was pale. Pulse of 100 shocks per minute, weak. right upper extremity is edematic. On the shoulder and the forearm the bubbles, filled with malodorous fluid/liquid. Wounds on the shoulder by size/dimension 2x2 and 4x3 cm with the black necrotic coating, which separate/liberate a large quantity of liquid malodorous pus. Next day after the admission of exarticulation of right upper extremity. During the subsequent days the operation wound in a good state. Pulse of 88 shocks per minute. 5/XII in injured person appeared so-called sardonic smile, it cannot open mouth; the spasm of masticatory muscles. 6/XII opisthotonus, stomach are strained as panel. Periodic general/common/total epileptoid spasms. 7/XII and into those following of dynes, in spite of serous treatment, phenomena of tetanus they progressed. 12/XII the cyanosis of jaws and entire face; general/common/total spasms, convulsive contractions/abbreviations of diaphragm/midriff. Death.

The treatment of injured people with the bullet break, which were complicated by tetanus, was conducted just as the treatment of gas infection, in the special anaerobic separations/sections. On the basis of the special features/peculiarities of the clinical course of disease, were applied general/ccmmon/total measures, specific and nonspecific therapy.

General/common/total measures during the treatment of tetanus were directed, first of all, toward the elimination of the external stimulations, which provoked the attacks/seizures/paroxysms of spasms and which peaked clinical symptoms. Creation for the injured rest in the wide value of this word presented therefore not simply organizational measure, but efficient therapeutic factor.

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Insulation/isolation of patients with tetanus in the individual wards, convenient bed, permanent attention and observation from side of the specially trained personnel, anesthetization with all the more or less considerable procedures were necessary conditions during the treatment of injured people with tetanus.

Special importance acquired the rational nourishment of injured people. On the basis of the understanding of the essence of clinical manifestations and pathogenesis of disease/sickness/illness/malady, to injured people gave the predominantly milk- plant food (acidosis), full-valued on the quality of products, their caloricities and content of vitamins. Taking into account the spasm of swallowing and intestinal musculature, certain injured people she was necessary to introduce the food through the probe or by feed enemas.

The intensive sweating of injured people forced energetically to fight with the dehydration of organism by introduction by the drop enemas of physiological solution and 50/o of solution/opening of glucose (insufficient function of the liver) in a quantity of 2-3 l in the course of twenty-four hours.

The intravenous introduction of fluids/liquids to avoid the overload of small blood circulation system was strictly limited only to special readings, and even if it was conducted, then in small quantities.

As a rule, in injured people, who sickened by tetanus, the function of urination was not disrupted. It was sometimes nevertheless necessary to resort to the artificial emptying of the bladder soft catheter. To put to use solid ones, and those by more metallic catheters in such injured people was categorically forbidden. If necessary for the emptying of intestine the preference was given up to enema, since the laxative substances led to the incremental loss of fluid/liquid.

The specific treatment of tetanus was realized by the introduction of antitetanus serum, moreover most frequently was applied the intramuscular and intravenous method of introduction, less frequent lumbar and suboccipital.

In some injured people the serum was introduced combined by all methods.

Introduction of serum directly to the cerebrospinal canal of special effect did not give.

The intravenous and lumbar introduction of serum was realized, as a rule, under the general anesthetization (hexenal, chloralhydrate).

The single dose of antitetanus serum during the intramuscular introduction varied to limits of 20000-150000 AE; with the intravenous - 30000-100000 AE, with the lumbar - 5000-20000 AE.

A quantity introduced once by one means or another of serum was determined depending on the severity of the course of disease/sickness/illness/malady. The total quantity of introduced during the treatment serum at separate injured people varied in limits of 26000-780000 AE; on the average it was introduced by 265000 AE.

It is necessary to note that the energetic and timely serous

treatment did not provide unconditional success, but it frequently proved to be unsuccessful. Therefore it could not be considered the method of selection.

Observed in some injured people phenomena of serous disease/sickness/illness/malady made it necessary to abstain from further introduction of serum; the fatal results, connected with the introduction of serum, never was observed.

Nonspecific treatment with tetanus, which complicated bullet breaks, consisted of general illness designation/purpose of the analgesic and somniferous substances, these substances having not only symptomatic, but also high therapeutic value. Extensively were used morphine, pantopon, chloralhydrate, sulfate magnesia.

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With the abatement of phenomena tetanus in connection with the anaemisation of patients resorted to the blood transfusion. This method of treatment was applied in the half all of those ached by tetanus.

Surgical treatment with tetanus, which complicated bullet breaks, had as a goal: 1) fight with existed simultaneously another

infection, most frequently rotting; 2) the removal/distance of foreign bodies as the probable foci of infection and finally 3) fight with the appeared complications.

From other surgical interventions, which were being conducted during the treatment of tetanus and in the period of the recovery of the injured people (these interventions it was necessary to apply in 1/3 injured people), most frequently resorted to the sections/cuts for the autopsy of phlegmons and suppurative flows, and also to sequesterectomy and reamputation. The need for the latter was caused by the wish to improve the results previously the made operations/processes.

The surgical treatment of the injured people, who sickened by tetanus, always required especial care. Therefore preference was given up to less traumatic methods and all operations/processes were conducted under the general anaesthetization. Sometimes surgical intervention led to the new outbreak of tetanus, true, with the less expressed phenomena. So had, for example, one injured person to whom after the abatement of the phenomena of tetanus they amputated thigh. In a day/every other day after operation/process in injured person appeared convulsive twitchings in another extremity, on which there were associated multiple blind-end fragmentation injuries. Injured person recovered.

Cure of tetanus to a considerable degree was determined by the manifestation of the clinical phenomena: the heavier there were these phenomena, the more unfavorable there was the prognosis.

The severity of the course of tetanus and issues in the large measure depended on the duration of incubation period. The phenomena of intoxication were usually expressed more strong with the short incubation period, although in separate injured people this position was not justified.

During the first two years of war the lethality from tetanus with the bullet breaks of the bones of extremities although was below than in the first world war, it nevertheless remained high. During the subsequent years, because of an improvement in the organizational and therapeutic measures, it steadily descended. Thus, if we accept lethality in 1941-1942 for 100o/o, then in 1943 it was equal to 87.5o/o, in 1944 - 50o/o, and in 1945 it composed only 19.0o/o.

highest lethality from tetanus was observed with the bullet breaks of shoulder and bones of forearm. The fatal results with local tetanus it was not noted.

Period from the day of the detection of tetanus in entered into the hospital injured people with the bullet break, which were complicated by tetanus, to the lethal outcome in connection with this disease, on the average was equal to 5 days' (shortest - 1 day, longest - 12 days), while the period of the duration of intoxication in the survived injured people - on the average 18 to days (shortest - 12 days, longest - 33 days). In the majority of the survived injured people was the most prolonged incubation period.

From the complications which were observed in injured people with the the bullet fracture, that transferred tetanus, in one injured person was pneumonia and disseminated tuberculosis, in another - polyneuritis.

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The duration of the stay in the hospitals of the recovered injured people, which ached by tetanus, varied from 81 to 360 days; on the average of 204 days; in this case with the break of shoulder - 184 days, bones of forearm - 132 days, thighs, 282 days, bones of shin - 235 days.

In the half the recovered injured with the bullet break of bones extremities, which were complicated by tetanus, one or the other

extremity was amputated, while in remaining at the termination of hospital treatment was observed either contracture or incomplete osteomyelitic process, or the two together, etc.

During the study of the protocols of the pathoanatomical autopsies of the dead injured people with bullet break of the bones of extremities, complicated tetanus, no pathognomonic for tetanus morphological changes in the organs/controls it was established/installed.

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Chapter V.

SEPTIC COMPLICATIONS OF THE BULLET BREAKS OF THE BONES OF
EXTREMITIES.

Statistical survey/coverage.

Professor is Colonel MC B. D. Dobychin.

By sepsis it is accepted to count the general infectious disease, which appears, as a rule, as the complication of the existing in the organism infectious focus as a result of reducing the natural resistivity of organism or under the special conditions of contamination.

Presently is placed the target of illuminating the character/nature of the septic complications only of the bullet breaks of long tubular bones, being limited only to the pyogenic infection, caused by pyogenic flora, clear the complications of another etiology (anaerobic flora, tetanus, etc.).

As qualitatively new process sepsis possesses its own laws governing the course and development. General/common/total questions of sepsis are already examined in the third volume. Therefore, without developing this theme, should be only noted special importance for the understanding of the pathogenesis of the suppurative surgery of the teaching of N. Ye. Vvedenskiy, I. P. Pavlov and his pupils of M. K. Petrovoy, I. O. Tsitovich, Yu. P. Frolov A. G. Ivanov-Smolenskiy. On the investigations of N. Ye. Vvedenskiy ¹ on the neuromuscular apparatus, the transition of excitation into the inhibition, which becomes apparent in the form of refractory phase, is characteristic for any excitation wherever it not occurred.

FOOTNOTE ¹. N. Ye. Vvedenskiy, excitation, inhibition and anesthesia/narcosis, 1902. ENDFOOTNOTE.

The laws, which are determining the oscillations/vibrations of the immunological reactivity of organism, are also the representation of the fundamental laws of excitation and inhibition. According to P. F. Zdrodovskiy's data ², following the phase of maximum immunization excitation it always begins gas of suppression, for elongation/extent of which animals lose capability for the production of antibodies under the effect of the supplementary antigenic stimulation.

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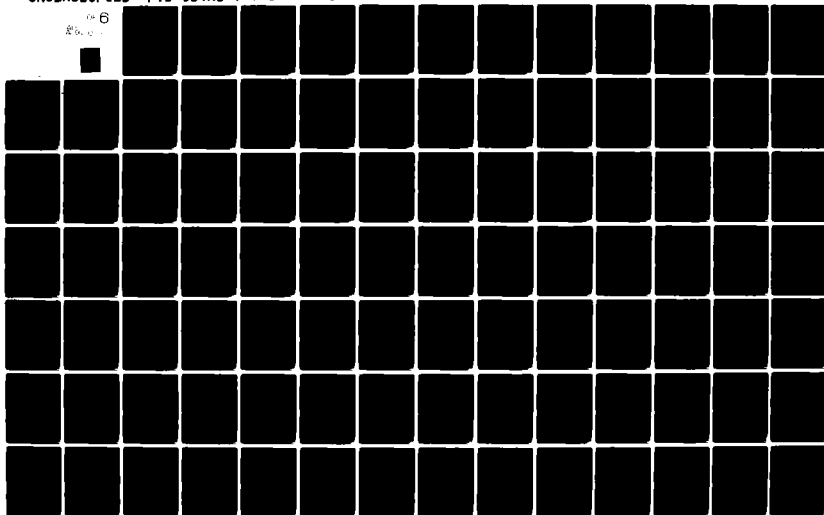
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FOOTNOTE 2. P. F. Zdrodovskiy, problem of reactivity in the teaching about the infection and immunity, M., 1950. ENDFOOTNOTE.

The septic phase of infection is connected with the preceding maximum immunization excitation and therefore is one of the forms/species of the manifestation of inhibition. In A. G. Ivanov-Smolenskiy's laboratory it was possible to establish that the character/nature and the severity of the course of different intoxication depend on the type of the higher nervous activity of animal and on the initial functional state of cerebral cortex; infectious intoxication with the overvoltage of the activity of cortex of brain and during its interruptions flowed/occurred/lasted long and heavily.

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During the Great Patriotic War there were numerous moments/torques which heavily traumatized psyche/psychics and nervous system, causing overvoltage and even interruptions which, it is doubtless, generally unfavorably influenced the course of wound process in injured people, in particular, with the bullet breaks.

According to the data of the development of the histories of disease/sickness/illness/malady, by most serious of the bullet breaks of the bones of extremities were the breaks of thigh not only by the

force of their high traumatism, which is accompanied by shock and hemorrhage, but also as a result of further complications sepsis. The bullet breaks of other divisions of extremities were complicated by heavy infection and sepsis considerably less frequent.

In the preantiseptic period the bullet breaks of the bones of extremities were accompanied by extremely high lethality; therefore as the most reliable method of treatment with the bullet breaks was considered amputation; however it insignificantly improved the results of treatment. Thus, according to N. I. Pirogov's data, "mortality after the early amputations of thigh it oscillated ... between 80 and 85o/o; it raised also for 90o/o, there were not several time, also, into 75o/o ...". As the main reason for death served septic complications.

Saving method of the treatment of N. I. Pirogov and antiseptics improved the results of the treatment of the bullet breaks of the bones of extremities; however the complications of infection remained a sulfurnon/without- threat.

On the septic complications with the bullet breaks of the bones of extremities in the first world war it is possible to judge according to following data (Table 108).

The primary processing/treatment of wounds and the more careful immobilization of extremities, and also other measures for prophylaxis and treatment at the beginning of the Great Patriotic War decreased the frequency of the complications of infection and sepsis with the bullet breaks, but they did not solve completely the problem of warning/prevention of complications and treatment of the bullet breaks, complicated by infection.

Table 108. Complications of sepsis and pyogenic infection of the bullet breaks of the bones of extremities in the first world war (according to different authors' data).

(1) Автор	(2) Год опубликования	(3) Армия	(4) Район	(5) Локализация перелома	(6) Число наблюдений	(7) Осложнения (в процентах)	
						(8) сепсис	(9) гнойно-гнойная инфекция
(10) Тихомиров И. А.	1915	(11) Русская	(12) Фронт-вой	(13) Плечо	165	6,6	48,4
(14) Ладыгин М. И.	1915	"	Тыловой	(17) Бедро	114	Не было	89,0
(15) Холин А. А.	1916	"	"	"	63	12,0	74,6
(16) Тимофеев С. А.	1916	"	"	"	121	—	77,0
(19) Тимофеев С. А.	1925	"	"	"	200	—	49,0
(20) Марведель (Marwedel)	1922	Германская	По всем районам	"	Неизвестно	—	71,7
		(21) То же	(22) То же	(23) Голень	(24) То же	—	58,3
		"	"	(25) Плечо	"	—	39,0
		"	"	(26) Предплечье	"	—	29,3
(27) Пертес (Perthes)	1922	"	"	(27) Плечо	1000	11,0	45,0

Key: (1). Author. (2). Year of publication. (3). Army. (4). Region. (5). Localization of break. (6). Number of observations. (7). Complications (in percentages). (8). sepsis. (9). pyogenic infection. (10). I. A. Tikhomirov. (11). Russian. (12). Front. (13). Shoulder. (14). Back. (15). It was not. (16). M. I. Ladygin. (17). Thigh. (18). A. A. Kholin. (19). S. A. Timofeev. (20). Marvedel (Marwedel). (21). German. (22). By all regions. (23). It is unknown. (24). then. (25). Shin. (26). Forearm. (27). Pertes (Perthes).

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According to the data of the development of the histories of

disease/sickness/illness/malady, the frequency of the complications of the sepsis of the bullet breaks of the bones of the extremities consisted of the bullet breaks of shoulder 1.10/o, bones of forearm - 0.20/o; on the average - 2.80/o.

On the frequency of the complications of the bullet breaks of thigh of pyogenic infection and sepsis in different stages of evacuation it is possible to judge according to the data of abstracts, reports and periodical articles for the time of the Great Patriotic War (Table 109).

According to published data the frequency of sepsis with the bullet breaks of thigh in the front region oscillated from 1.5 to 18.50/o; in the deep rear - from 2.9 to 15.10/o. Thus, the complications of sepsis more frequently were encountered in the front region. The complications of infection in the heavy form most frequently were encountered in the deep rear.

If we compare the scanty statistical data about the septic ones complications in the first world war with the bullet breaks of thigh with more numerous data for the period of the Great Patriotic War, then it will seem that the sepsis with the bullet breaks of thigh was encountered during the Great Patriotic War less frequently than in the Russian army in the first world war. However, the individual

authors (M. S. Lur'ye and B. P. Cyril) had higher numerals. Based on materials of authors' majority (except A. V. Melnikov), within the period of the Great Patriotic War the percentage of complications the heavy form of infection was below than the percentage, shown by the Russian and foreign authors in the first world war (Table 108).

The complications of sepsis with the bullet breaks of shoulder in the Great Patriotic War also were lowered, after comprising, according to the data of the development of the histories of disease/sickness/illness/malady, 1.10/o, while in the first world war the authors was called numeral into 11.00/o (Pertes) in German army and 6.60/o (I. A. Tikhomirov) - in the Russian army.

Table 109. Complications of the pyogenic infection of the bullet breaks of thigh in the different stages of evacuation in the Great Patriotic War (according to different authors' data).

(1) Автор	(2) Год опубликования	(3) Число наблюдений	(4) Осложнение		
			(5) раневой сепсис	(6) тяжелая инфекция	
(7) По фронтовому району					
(9) Аскалонов Н. Н.	1944	403	Не приведено	6,0	
(10) Беркутов А. Н.	1947	1466	1,5	11,7	
(11) Куслик М. И.	1947	1800	Не приведено	7,6	
(12) Лурье М. С.	1946	456	18,5	Не приведено	
(13) Слюсарь Я. В.	1945	432	9,0	9,5	
(14) Шихбазян Е. С.	1945	Не приведено	10,0—12,8	Не приведено	
(15) По глубокому тылу					
(16) Березов Е. Л.	1943	317	4,4	Не приведено	
(17) Кириллов Б. П.	1946	310	15,1	То же	
(18) Мельников А. В.	1944	Не приведено	2,9	80,0	
(19) Теплов С. В.	1946	975	Не приведено	40,0	
(20) Туминюк Л. Л.	1942	150	То же	23,1	
(21) Хавкин Л. С.	1947	368	11,1	65,2	

Key: (1). Author. (2). Year of publication. (3). Number of observations. (4). Complication. (5). wound sepsis. (6). heavy infection. (7). By front region. (8). N. N. Askalonov. (9). it is not given. (10). A. N. Berkutov. (11). M. I. Kuslik. (12). M. S. Lur'ye. (13). Ya. V. Slyusar'. (14). Ye. S. Shakhbazyan. (15). On deep rear. (16). Ye. L. Berezov. (17). B. P. Cyril. (17a). The same. (18). A. V. Melnikov. (19). S. V. Teplov. (20). L. L. Tuminyuk. (21). L. S. Khavkin.

Analyzing given above statistical data of the Soviet authors, it

is possible to state/establish the considerable variations of the frequency of the complications of sepsis, which is explained by the diversity of the conditions of the separate regions, in which these complications became apparent. At the same time it must be noted that the diagnosis of sepsis was placed by different authors not always on the homogeneous clinical symptoms, but percentages sometimes were calculated on the small number of observations.

Data of the development of the histories of disease/sickness/illness/malady made it possible to sufficiently objectively refine the specific gravity/weight of the complications of the sepsis of the bullet breaks of the bones of extremities in the Great Patriotic War (Table 110).

According to the experiment/experience of the Great Patriotic War, complication of sepsis grew on in stages the evacuations up to the front region. However, in the deep rear the frequency of septic complications sharply was decreased and with the bullet breaks of thigh it was only sufficiently noticeable. This phenomenon is explained by the special features/peculiarities of the course of sepsis with the breaks of the bones of different segments of extremities.

The periods of the development of sepsis with the breaks of the

different bones of extremities are dissimilar (Table 111).

The periods of the onset of sepsis with the bullet breaks were found in a strict dependence on the massiveness of the segment of extremity. Thus, into the first five days was observed the following sequence of the frequency of the manifestation of sepsis (in the decreasing order): forearm, shoulder, shin, thigh; from the 16th day and late the frequency of sepsis decreased in the reverse order: thigh, shin, shoulder, forearm. This law is explained by the pattern of the flow of breaks at the different level; is the less massive the segment of extremity, the more easily flow/occur/last the breaks and the more easily is distinguished the nature of infectious complications with their onset.

Table 110. Frequency of the complications of sepsis with the bullet breaks of the bones of extremities in the different regions of evacuation (in the percentages).

(1) Локализация перелома	(2) Район эвакуации	(3) Военной	(4) Армейский	(5) Фронтный	(6) Тыловой	(7) Всего
(8) Плечо		0,05	0,4	0,4	0,2	1,1
(9) Предплечье		—	0,07	0,1	0,03	0,2
(10) Бедро		0,2	3,1	4,1	2,1	9,5
(11) Голень		0,1	0,9	0,9	0,3	2,2

Key: (1). Localization of break. (2). Region of evacuation. (3). Army. (4). Army. (5). Front. (6). Back. (7). In all. (8). Shoulder. (9). Forearm. (10). Thigh. (11). Shin.

Table 111. Periods of the development of sepsis with the bullet breaks of the bones of extremities (in the percentages).

(1) Локализация перелома	(2) Срок развития сепсиса (по суткам)	5	6—15	16—30	31—60	(3) 61 и более	(4) Всего
(5) Плечо		44,0	45,0	5,0	3,0	3,0	100,0
(6) Предплечье		55,0	40,0	5,0	—	—	100,0
(7) Бедро		2,0	41,0	25,0	18,0	14,0	100,0
(8) Голень		30,0	46,0	16,0	6,0	2,0	100,0

Key: (1). localization of break. (2). Period of development of sepsis (on days). (3). 61 and more. (4). In all. (5). Shoulder. (6). Forearm. (7). Thigh. (8). Shin.

On the dynamics of the diseases by sepsis in the course of the Great Patriotic War it is possible to judge according to the data of Table 112.

The difference of the frequency of the diagnoses of the complications of sepsis in the years of the Great Patriotic War with the bullet breaks of the bones of extremities was not great, in this case was determined even certain tendency to an increase in the frequency of these diagnoses. The latter fact, however, in no way it can characterize from disadvantage entire setting of prophylaxis of sepsis during the Great Patriotic War, but it is explained by the fact that each year of war was increased the frequency of those injuries, with which was observed a great number of complications of sepsis, in particular, the fragmentation, combined and multiple injuries (Table 113). Was improved also the diagnosis of sepsis.

Etiology and pathogenesis.

During the explanation of etiology and pathogenesis of sepsis, first of all, one should stop at the dependence of the development of septic complications on form/species and character/nature of injuries, means of break, its level and associated injuries.

Relative to the frequency of the complications of the infection

of the bullet breaks of the bones of extremities it is known that with the fragmentation and blind-end injuries it was above than with the bullet ones and the through ones. However, the statistical data about the dependence of septic complications on the genus no not wounding projectile in the literature there is.

Data of the development of the histories of disease/sickness/illness/malady in regard to this are represented in Table 114.

Table 112. Frequencies of the complications of sepsis with the bullet breaks of the bones of extremities during the different years of war (in the percentages) .

(1) Локализация перелома	(2) Год					(3) В среднем
	1941	1942	1943	1944	1945	
(4) Плечо	—	0,7	1,4	1,1	1,6	1,1
(5) Предплечье.	—	0,2	0,1	0,3	0,1	0,2
(6) Бедро	6,7	9,3	10,6	8,3	11,5	9,5
(7) Голень	0,7	2,4	2,7	1,9	2,4	2,2

Key: (1). Localization of break. (2). Year. (3). On the average. (4). Shoulder. (5). Forearm. (6). Thigh. (7). Shin.

Table 113. Frequency of the fragmentation, combined and multiple injuries with the bullet breaks of the bones of extremities.

(1) Ранения	(2) Год войны	(3) Первый	(4) Второй	(5) Третий	(6) Четвертый
(7) Осколочные.		27,1	40,1	43,6	47,7
(8) Комбинированные и множественные . .		24,6	27,6	29,8	30,3

Key: (1). Injuries. (2). Year of war. (3). The first. (4). The second. (5). The third. (6). The fourth. (7). Fragmentation. (8). Combined and multiple.

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Given data testify about the larger danger of fragmentation

injuries in comparison with the bullet ones in the sense of the complications of sepsis.

According to the data of the development of the histories of disease/sickness/illness/malady, strict dependence of the development of sepsis on the character/nature of injury with the bullet breaks of the bones of extremities for all segments cannot be established/installed.

As can be seen from Table 115, the frequency of the development of sepsis depends on the severity of the bullet break of the bones of extremities.

Pulverized chalk and large-splintered breaks were complicated by the sepsis of more frequent than simple ones (cross, longitudinal, packed in, edge/boundary and perforated). Sepsis most frequently appeared with the heaviest compound fractures - crushed.

Based on materials M. I. Kuslika, S. G. Rukosuyev and B. G. Leshchinskiy, levels of the break of thigh to the known degree determined his severity, the complications of infection appearing more frequently with the breaks lower and middle third.

According to the data of the development of the histories of

disease/sickness/illness/malady, the sepsis was observed more frequently with the breaks upper third and for the elongation/extent of several thirds of segment of extremity (Table 116).

The value of the level of injury in the development of sepsis can be to a certain degree connected with the propagation of infection for the adjacent large/coarse joints, especially in the presence of cracks. Very severe complication was the secondary inflammation of hip, knee, shoulder, elbow and radiocarpal joint. On the severity of the course of sepsis from the enumerated joints were secreted first three.

Table 114. Frequency of the complications of sepsis with the bullet breaks of the bones of extremities in the dependence on the means of injury (in the percentages).

(1) Вид ранения	(2) Локализация перелома			
	(3) Плечо	(4) Предплечье	(5) Бедро	(6) Голень
(7) Пулевое	0,6	0,1	8,6	1,5
(8) Осколочное	1,5	0,5	10,6	2,8

Key: (1). Means of injury. (2). Localization of break. (3). Shoulder. (4). Forearm. (5). Thigh. (6). Shin. (7). Bullet. (8). Fragmentation.

Table 115. Frequency of the complications of sepsis depending on the form/species of the bullet break of the bones of extremities (in the percentages).

(1) Локализация перелома	(2) Вид перелома								
	(3) Раздробленный	(4) Мелно-оскольчатый	(5) Крупно-оскольчатый	(6) Поперечный	(7) Косой	(8) Продольный	(9) Пилообразный	(10) Краевой	(11) Дырчатый
(12) Плечо	1,9	0,4	0,5	0,6	0,2	—	—	0,6	—
(13) Предплечье	0,6	0,3	—	—	0,2	—	—	—	—
(14) Бедро	18,3	16,4	9,9	9,7	7,1	5,7	2,7	2,7	2,4
(15) Голень	6,6	1,2	1,5	0,8	0,2	—	—	0,7	0,7

Key: (1). Localization of break. (2). Form/species of break. (3). Crushed. (4). Small-splintered. (5). Large-splintered. (6). Cross. (7). By scythe. (8). Longitudinal. (9). Packed in. (10). Edge/boundary. (11). Perforated. (12). Shoulder. (13). Forearm. (14). Thigh. (15). Shin.

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According to the data of author's development, secondary complications from the side of joints were observed with the breaks of shoulder in 6.70/o, bones of forearm - in 8.70/o, thighs - in 10.30/o, the bones of shin - in 13.90/o of injured people.

In those injured people, in whom, besides the basic injury - break, were encountered other still injuries, i.e., with the combined and multiple injuries, the complication of sepsis was observed more frequently (Table 117). Consequently, supplementary injury weakened and made worse the state of injured person.

The represented above information about connection/communication of septic complications with the character/nature of break, form/species of the wounding projectile, etc. are very important for the understanding of etiology and pathogenesis of the septic complications of the bullet breaks of long tubular bones. However, to the course, the development of complications and the issue of injury this could not have the decisive effect separately from the entire totality of the factors of the therapeutic and prophylactic character/nature.

For prophylaxis of the sepsis of bullet breaks far not low value has rational rendering of first aid. On the study of the effect of first aid and first medical aid on a reduction in such early complications as shock, hemorrhage, is a considerable literature, what cannot be said in the relation to prophylaxis of sepsis. Kh. M. Feldman in the Great Patriotic War tried to give the evaluation of the effectiveness of prophylaxis of sepsis in connection with the period of the carrying out/removal of injured people from the field of breakage and the quality of immobilization with the bullet breaks of thigh; but it did not contain the sufficient estimate of facts, the favorable effect was of the sufficient estimate of facts, the the beneficial effect of first aid subsequently to a considerable extent could be paralyzed with a number of such circumstances as the severity of injury, the defects of primary surgical processing/treatment, etc.

Table 116. Frequency of the complications of sepsis with the bullet breaks of the bones of extremities at the different level (in the percentages).

(1) Локализация перелома	(2) Уровень перелома			
	(3) Верхняя треть	(4) Средняя треть	(5) Нижняя треть	(6) из противни или нескольких третей
(7) Плечо	1,3	1,0	0,7	1,0
(8) Предплечье	0,4	0,3	0,1	2,0
(9) Бедро	11,4	8,9	8,2	10,2
(10) Голень	3,4	1,7	1,9	3,4

Key: (1). Localization of break. (2). Level of break. (3). upper third. (4). middle third. (5). lower third. (6). for elongation/extent several third. (7). Shoulder. (8). Forearm. (9). Thigh. (10). Shin.

Table 117. Frequency of the complications of sepsis with the bullet breaks of the bones of extremities with the multiple injuries and with the single injury (in the percentages).

(1) Группа раненых	(2) Локализация перелома	(3) Плечо	(4) Предплечье	(5) Бедро	(6) Голень
(7) С множественными ранениями . .		1,8	0,5	11,8	3,2
(8) С одиночным ранением		0,6	0,2	8,4	1,8

Key: (1). Group of injured people. (2). Localization of break. (3). Shoulder. (4). Forearm. (5). Thigh. (6). Shin. (7). With multiple injuries. (8). With single injury.

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According to the data of the development of the histories of disease/sickness/illness/malady, was made the attempt establish/install effect the quality also of the periods of rendering of first aid and transport immobilization on warning/prevention of sepsis (Table 118).

As can be seen from Table 118, most rarely sepsis it was observed in injured people, by which first aid proved to be by way of auto- and mutual assistance (easily injured people, first aid by it it was shown/rendered within the earliest period), more frequent - in those injured people who in view of heavier injury could not make themselves a dressing, but medical orderly or sanitary instructor they rendered to them assistance within the later period finally most frequently the sepsis was noted in those injured people (with the break of thigh and bones of shin), by which aid rendered the feldsher or doctor. It is completely logical that in the latter the aid was most frequently most late, since feldsher and doctor in the combat subdivisions it was not; furthermore, to the feldsher or doctor they supplied/delivered/fed into the heavily injured who needed the fastest qualified aid. Thus, data of Table 118 clearly reveal/detect the positive value of rendering to early first aid and the negative value of the severity of the break in prophylaxis of sepsis. the

general/common/total opinion that the early rendering of first aid and the early use/application of transport immobilization reduce a number of complications of sepsis, was completely confirmed by following data of the development of the histories of disease/sickness/illness/malady (Table 119).

Table 118. Frequency of the complications of the sepsis of the bullet breaks of the bones of extremities in the comparison with the data about the those, who rendered aid by injured person (in the percentages of each group of localization of break) .

(1) Кем оказана первая помощь	(2) Локализация перелома	(3) Плечо	(4) Пред-плечье	(5) Бедро	(6) Голень
(7) Само- и взаимопомощь		0,7	0,3	8,5	1,7
(8) Санитар и санитарный инструктор		1,2	0,3	9,6	2,1
(9) Фельдшер, врач		0,7	0,1	10,5	3,8

Key: (1). By whom is shown/rendered first aid. (2). Localization of break. (3). Shoulder. (4). Forearm. (5). Thigh. (6). Shin. (7). Auto- and mutual assistance. (8). Medical orderly and sanitary instructor. (9). Feldsher, doctor.

Table 119. Frequency of the complications of sepsis with the bullet breaks of thigh and bones of shin in the dependence on the period of rendering of first aid and use/application of transport immobilization (in the percentages) .

(1) Локализация перелома	(2) Вид помощи	(3) Сроки оказания помощи			
		(4) Первые сутки (в часах)			(5) Вторые сутки и позже
		1	2-6	7-24	
(6) Бедро	(7) Первая повязка	8,5	8,3	11,0	14,5
(8) Голень	(9) Транспортная иммобилизация	9,0	9,7	—	10,6
	① Первая повязка	2,1	2,3	1,7	2,6
	② Транспортная иммобилизация	2,3	2,2	—	1,7

Key: (1). Localization of break. (2). Means of aid. (3). Period of

rendering aid. (4). first day (in hours). (5). second day are later. (6). Thigh. (7). First bandage. (8). Transport immobilization. (9). Shin.

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These data characterize the position, that delay in the rendering of first aid and the use/application of transport immobilization with the bullet breaks of the bones of lower extremities on the whole entailed the more frequent complications of sepsis. To the overwhelming majority of injured people with the break of the bones of upper extremity first aid proved to be within the earlier periods, since these injured people could leave from the field of breakage without first aid. Therefore regular connection/communication of the complications of sepsis with the periods of rendering of first aid in those wounded into the upper extremities it is not established/installed.

The character/nature of transport immobilization also had high value in warning/prevention of different complications in view of which to its quality were presented serious requirements. For the development/detection of the effectiveness of transport immobilization in warning/prevention of sepsis are undertaken comparative data of two groups of the injured people, who were being

located in the state of sepsis and who did not have it (Table 120).

Although in injured people, who had the complication of sepsis, the best methods of transport immobilization (for the lower extremity of the splint of Diterich and Thomas, for the upper - splint of Cramer) they were applied more frequently than in injured people, who did not have sepsis, it is necessary to recognize this preponderance as insufficient, since the heavy breaks in the first group (with the sepsis) were encountered considerably more frequently than the secondly (without the sepsis).

For warning/preventing the infection vital importance have the early periods of the primary surgical processing/treatment of wounds. Therefore in war entire organization of the medical aid by injured person with the bullet break was directed toward this target.

The complications of infection were encountered more frequently with the nonobservance of the early periods of primary surgical processing/treatment. First of all, of course, appeared the danger of the development of anaerobic infection, while subsequently - and pyogenic infection. A. N. Berkutov already in the near front rear observed in injured people, who were not undergoing the dissection of wound with the bullet break of thigh, complication of infection into 70.10/o, in 11.70/o wound infection carried heavy character/nature, of them in 1.50/o it was noted, according to the expression of the author, pattern of "present sepsis".

Table 120. Distribution of injured people according to the character/nature of transport immobilization in the groups with the sepsis and without it with the bullet breaks of the bones of extremities (in the percentages).

(1) Локализация перелома	(2) Группа раненых	(3) Вид транспортной иммобилизации					(9) Итого
		(4) шина Дитерихса	(5) шина без указания ее вида	(6) шина Крамера	(7) шина Томаса	(8) прочие	
(10) Плечо	(11) С сепсисом . .	—	30,0	56,6	—	13,4	100,0
(13) Предплечье	(12) Без сепсиса . .	—	36,0	46,5	—	17,5	100,0
(14) Бедро	(13) С сепсисом . .	—	35,0	44,9	—	20,1	100,0
(15) Голень	(14) Без сепсиса . .	—	40,5	19,9	—	39,6	100,0
	(15) С сепсисом . .	48,2	30,1	7,1	3,8	10,8	100,0
	(16) Без сепсиса . .	39,7	30,7	13,8	3,7	12,1	100,0
	(17) С сепсисом . .	2,4	39,5	42,8	2,4	12,9	100,0
	(18) Без сепсиса . .	1,2	36,1	40,4	1,1	21,2	100,0

Key: (1). localization of break. (2). Group of injured people. (3). Form/species of transport immobilization. (4). splint of Dieterich. (5). splint without indication of its form/species. (6). splint of Cramer. (7). Thomas's splint. (8). other. (9). Altogether. (10). Shoulder. (11). With sepsis. (12). Without sepsis. (13). Forearm. (14). Thigh. (15). Shin.

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Among the surgical processed injured people, according to its observations, the complications of infection arose predominantly in connection with the late periods of primary surgical processing/treatment. Thus, for instance, in group of injured people

with the bullet break of thigh, processed to 12 hours, the development of heavy infection and sepsis occurred in 7.00/o, while among those processed to 24 hours - in 17.30/o. The dependence of the onset of sepsis on the periods of primary processing/treatment is represented in Table 121 (according to the data of the development of the histories of disease/sickness/illness/malady).

From represented data it follows that most rarely sepsis it was observed after processing/treatment in the first six hours after injury; exception/elimination were the breaks of the bones of the shin where most rarely sepsis it was developed after processing/treatment in time from 13 to 24 hours. In the second place in the frequency of sepsis stood those injured people whose hour of processing/treatment established/installed could not be. Evidently, in all injured people breaks were processed also for the first six hours. As far as periods are concerned other of processing/treatment, then no laws in the development of sepsis it is noted.

Table 121. Frequency of the complications of sepsis with the bullet breaks of the bones of extremities in the dependence on the periods of primary surgical processing/treatment (in the percentages).

(1) Локализация перелома	(2) Срок обработки	(3) Первые сутки					вторые сут- ки и позже	(8) В среднем	
		(4) 6 часов	(5) 7—12 часов	(6) 13—24 часа	(7) час не указан	(8) в сред- нем		(9) среди обрабо- танных	(10) среди необрабо- танных
(11) Плечо		0,8	1,6	1,2	1,0	1,1	1,2	1,1	0,4
(12) Предплечье		0,1	0,5	0,5	0,3	0,4	0,2	0,3	0,1
(13) Бедро		8,3	11,2	11,0	9,6	9,7	11,5	10,4	5,5
(14) Голень		2,6	3,1	2,1	2,2	2,5	2,4	2,4	1,1

Key: (1). Localization of break. (2). Period of processing/treatment. (3). First day. (4). hours. (5). hour is not shown. (6). on the average. (7). Second day are later. (8). On the average. (9). among those processed. (10). among those not finished. (11). Shoulder. (12). Forearm. (13). Thigh. (14). Shin.

Table 122. Distribution of injured people with the bullet break of the bones of extremities according to the periods of primary surgical processing/treatment in connection with the complication of sepsis (in the percentages).

(1) Локализация перелома	(2) Сроки первич- ной обработки	(4) Первые сутки					(8) Втор- ые сутки и поз- же	(9) Всего	(10) Не было обра- бота- но	
		(3) Группа раненых	(5) 6 часов	7-12 часов	13-24 часов	(6) час не ука- зан				(7) Итого
(11) Плечо	(12) С сепсисом		14,0	30,5	18,6	14,0	75,1	24,9	100,0	14,3
	Без сепсиса		20,5	22,3	18,5	18,3	75,6	24,4	100,0	30,4
(14) Пред- плечье	С сепсисом		6,6	33,3	28,6	13,3	79,8	20,2	100,0	21,7
	Без сепсиса		21,4	19,8	18,9	14,2	72,3	27,7	100,0	44,6
(15) Бедро	С сепсисом		8,7	19,3	18,5	11,1	57,6	42,4	100,0	14,4
	Без сепсиса		15,5	18,2	17,8	12,4	63,9	36,1	100,0	25,6
(16) Голень	С сепсисом		18,0	23,0	18,4	10,6	88,0	32,0	100,0	12,6
	Без сепсиса		17,8	18,7	19,3	12,0	67,8	32,2	100,0	24,7

Key: (1). Localization of break. (2). Period of primary processing/treatment. (3). Group of injured people. (4). First day. (5). hours. (6). hour is not shown. (7). altogether. (8). Second day are later. (9). In all. (10). It was not processed. (11). Shoulder. (12). With sepsis. (13). without sepsis. (14). Forearm. (15). Thigh. (16). Shin.

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In spite of the primary surgical processing/treatment, produced even into the early periods, the frequency of the complications of sepsis among the most heavily injured people could not be lowered in comparison with the injured people with the more mild cases of the breaks where it was not required surgical processing/treatment; this also found its reflection in Table 121.

The advantage of early processing/treatment can be judged also from comparative data about the periods of processing in the groups of injured people with the complication of sepsis, also, without it (Table 122).

Analyzing data of Table 122, it is possible to note that among the injured people with the complication of sepsis those processed to 6 hours were encountered more rarely than among injured people, whose sepsis did not develop (with exception of those wounded the shin).

Thus, a reduction in the frequency of the complications of sepsis, other conditions being equal, could be achieved/reached only due to the acceleration of primary surgical processing.

The position, that the quality of primary surgical processing influenced the course of bullet breaks and the onset of complications, special proofs it does not require. As one of the numerous examples, which indirectly illustrate better course of the bullet breaks in connection with the increase in recent years of the war of the quality of surgical processing, can serve data of M. N. Lyubimov (Table 123).

On the effect of the quality of the primary surgical processing of the bullet breaks of the bones of extremities on the development of sepsis gives representation Table 124 (according to the data of the development of the histories of disease/sickness/illness/malady).

Table 123. Stats of injured people with the bullet break of thigh after the admission in front of SEG in the different periods of war (according to M. N. Liubimov's data, in the percentages).

(1) Состояние раненого	(2) Время наблюдения	(3)	(4)
		1943 г. июль — сентябрь	1944 г. август — ноябрь
(5) Тяжелое		10,0	3,0
(6) Средней тяжести		24,0	21,0
(7) Удовлетворительное		66,0	76,0
(8) Итого		100,0	100,0

Key: (1). State of injured person. (2). Time of observation. (3). 1943 July - September. (4). 1944 August - November. (5). Heavy. (6). Average/mean severity. (7). Satisfactory. (8). Altogether.

Table 124. Frequency of the complications of sepsis after different character/nature of the primary surgical processing of the bullet breaks of the bones of extremities (in the percentages).

(1) Локализация перелома	(2) Характер обработки	(3) Рассечение	(4) Рассечение и иссечение	(5) Рассечение и иссечение			
				(6) с перевязкой сосудов	(7) с удалением инородных тел	(8) с удалением костных осколков	(9) с обработкой фрагментов
(10) Плечо		0,8	1,9	3,1	—	1,4	0,9
(11) Предплечье		0,1	0,3	1,4	0,9	0,4	—
(12) Бедро		10,4	8,8	10,7	8,5	14,2	21,8
(13) Голень		2,0	2,7	2,6	1,5	5,3	9,1

Key: (1). Localization of break. (2). Character/nature of processing. (3). Dissection. (4). Dissection and carving. (5). Dissection and carving. (6). with dressing of vessels. (7). with removal/distance of foreign bodies. (8). with removal/distance of bone fragments. (9). with processing of fragments. (10). Shoulder. (11). Forearm. (12). Thigh. (13). Shin.

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From Table 124 it is evident that in the frequency of the onset of sepsis after the different type of processing/treatment of the bullet breaks of the bones of all segments of extremities, with exception of forearm, in the decreasing order occurred: the operations/processes on the bones (removal/distance of bone fragments, processing/treatment of fragments), the dressing of vessels and other operations/processes. Most rarely sepsis it appeared after the removal/distance of foreign bodies.

It is very important to trace the frequency of the complications of sepsis after the different character/nature of the primary processing/treatment of the separate forms/species of break. In the relation to the breaks of thigh these data are represented in Table 125.

If we exclude the dressing of vessels as the forced element of primary processing/treatment, then it will seem that only with the crushed breaks the radical processing/treatment was more advisable

than the simple dissection of wound; with the crushed breaks was inexpediently also the abstention from the processing/treatment.

Analogous data are acquired with the breaks of the bones of shin; so, with the fragmented breaks after the simple dissection of wound the sepsis was observed in 0.80/o of injured people, and during processing/treatment of another character/nature - more frequently (to 14.30/o); with the crushed break after dissection - in 8.70/o, during processing/treatment of another character/nature - to 16.70/o.

In what degree the dependence of the frequency of sepsis presented on the character/nature of processing/treatment affected the complications of the sepsis of the bullet breaks of thigh during the separate years of war, evidently from the comparison of data of **T**able 112 and 126.

Table 125. Frequency of the complications of sepsis in connection with the character/nature of primary surgical processing/treatment and the form/species of the break of thigh (in the percentages).

(2) Вид перелома	(1) Характер обработки	(3) Распечение		(4) Распечение и иссечение					(5) В среднем	
		(3)	(3)	(4a) с перевязкой сосуда	(4a) с удалением инородных тел	(4a) с удалением костных осколков	(4a) с обработкой фрагментов	(4a) с обработкой фрагментов	(5a) у обработанных	(5a) у необработанных
(11) Дырчатый и краевой . . .		2,0	1,3	—	4,5	14,7	—	2,8	1,8	
(11a) Косой, продольный, поперечный		9,7	8,2	33,3	5,1	10,6	20,0	8,7	4,0	
(12) Оскольчатый		10,0	9,4	19,0	12,0	11,7	43,7	10,2	9,0	
(13) Раздробленный		25,9	14,3	13,3	10,0	22,7	—	16,0	30,0	

Key: (1). Character/nature of processing/treatment. (2). Form/species of break. (3). Dissection. (4). Dissection and carving. (4a). Dissection and carving. (5). with dressing of vessel. (6). with removal/distance of foreign bodies. (7). with removal/distance of bone fragments. (8). with processing/treatment of fragments. (8a). On the average. (9). in those processed. (10). in those not finished. (11). Perforated and edge/boundary. (11a). By scythe, longitudinal cross. (12). Fragmented. (13). Crushed.

Table 126. Character/nature of primary surgical processing/treatment with the bullet breaks of thigh during the different years of war (in the percentages) .

(1) Год	(2) Обработка костной раны	(3) Прочие виды обработки	(4) Воздержание от обработки
1941	9,2	90,8	50,7
1942	11,9	88,1	34,1
1943	17,0	83,0	22,4
1944	21,6	78,4	15,1
1945	28,7	71,3	12,1

Key: (1). Year. (2). Processing/treatment of bone wound. (3). Other means of processing/treatment. (4). Abstention from processing/treatment.

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As can be seen from Table 126, with each year of war ever more radically was performed the primary surgical processing/treatment of the bullet breaks of thigh (from 9.2 to 28.7o/o) and was decreased a number of abstentions on the processing/treatment (from 50.7 to 12.1o/o). This must be placed in connection/communication with an improvement in the organization of surgical aid, and also with an increase in the severity of injuries in the years of war. Although the numerals, which indicate directly an increase in the severity of the breaks of thigh in the years of war, and are not great, for example, a number of crushed breaks of thigh, with which most

frequently was observed the sepsis, with 13.90/o during the first year of war it increased only to 15.60/o in the third year however the severity of injury each year of war was increased also due to the increase of a quantity of fragmentation injuries (with 43.40/o in the first year to 46.20/o in the fourth year) and multiple injuries (from 28.6 to 30.60/o); with these means of injuries the complication of breaks of sepsis was observed more frequently than with the bullet and single injuries (see Table 114 and 117).

Thus, one should recognize that for warning/preventing the complications of the sepsis of the bullet breaks of thigh most advisable processing/treatment in all forms of break (except that crushed) was the dissection and carving. The increase within the time of war radicalism of processing/treatment of the bullet breaks of thigh was caused by an increase with the course of the war of the severity of the injuries of thigh. Therefore radicalism it was possible to prevent a considerable increase in the frequency of the complications of the sepsis of the bullet breaks of thigh.

On the quality of surgical processing/treatment the doubtless effect is exerted the method of anesthetization. The local anesthesia, which obtained in the surgery of peacetime wide distribution, rightfully was applied widely and in war. However, it is necessary to recognize that during the heavy damages, which

undoubtedly include the bullet breaks of the bones of extremities, local anesthetization limited operational possibilities, without making it possible to fulfill the surgical processing/treatment of wound sufficiently radically. Therefore in the group of the injured people, in whom developed the sepsis where there was more than heavy breaks, the general/common/total anesthetization was applied more frequent than the local (table 127).

Into the primary surgical processing/treatment of bullet breaks entered intervention on the soft tissues and on the bones.

Table 127. Distribution of injured people with the bullet break of the bones of lower extremity, the complicated and not complicated sepsis, according to the character/nature of anesthetization during the primary surgical processing/treatment (in the percentages).

(1) Локализация перелома	(2) Группа раненых	(3) Обезболивание		(6) Всего
		(4) местное	(5) общее	
(7) Бедро	С сепсисом	34,4	65,6	100,0
	Без сепсиса	41,3	58,7	100,0
(10) Голень	С сепсисом	33,3	66,7	100,0
	Без сепсиса	51,7	48,3	100,0

Key: (1). Localization of break. (2). Group of injured people. (3). Anesthetization. (4). local. (5). general/common/total. (6). In all. (7). Thigh. (8). With sepsis. (9). Without sepsis. (10). Shin.

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However, in the wartime this operation/process frequently was dismembered, moreover one moment/torque was fulfilled in one stage (on DMP), and the second - in the subsequent stages, since processing/treatment of bone, which required X-ray test and special conditions for applying the immobilization gypsum or skeletal/skeleton stretching, it was necessary to transfer into the specialized hospitals of army and front rear.

In the literature during the period of the Great Patriotic War

is noted the favorable effect of the specialized aid for a reduction in the frequency of complications of sepsis and lethality.

According to the observations, which were being conducted in front (1943) and army (1944-1945) PPG of the course of the bullet breaks of thigh in 1 141 injured people, N. S. Voronov noted the decrease of lethality with 10.2c/o in 1943 to 6.3o/o in 1944-1945. This is explained, besides a change in the profile/specialty of hospital, by transition for the more radical primary surgical processing/treatment of injured people with the more frequent use/application of amputations.

N. P. Shastin considered achievement that in the specialized hospital with the bullet breaks of thigh the percentage of the complications of sepsis did not rise above 2.1; meanwhile among these injured people there were numerous such, which produced defective primary surgical processing/treatment, in consequence of which in 30.0o/o of them was required repeated surgical intervention.

Basic principle in the system of the line-of-communication treatment of the bullet breaks was the successive specialized aid, beginning from the army therapeutic institutions; in further stages in the front and deep rear it was conducted check and treatment of the bullet breaks and their complications also in the specialized

hospitals.

The specialization of surgical aid in the stages of evacuation contributed to an improvement in the procedure of processing/treatment of bullet break and to the use/application of the most ideal methods of immobilization and had an essential effect on the course of injuries; in this case it came to light, that the earlier fell the injured person into the specialized hospital, the less it was septic complications.

Repeated interventions in many injured people, about which speech it will be in front, were undertaken apropos of complications and carried symptomatic character/nature, i.e., they were directed toward the elimination of suppurative focus. The positive role of repeated interventions for warning/preventing further propagation of infection and sepsis was completely obvious.

Clinic.

The basic pathogenetic, clinical and differential-diagnostic symptom of local and general/common/total suppurative infection is the development of morphological and clinical changes in the organism independent of the state of the focus of the introduction of infection (I. G. Rufanov). I. V. Davydovskiy considered this position

as firm and in the pathology of combat trauma.

However, this solidly steady in the pathology of peacetime representation met the objection of the series/number of the pathologists (A. P. Avtsyn, S. S. Vayl'). Surgeons in practice could ascertain that interventions on the focus of infection frequently changed to the best side the course of septic process. M. I. Kuslik correctly noted that radical surgical intervention and amputation in the series/number of injured people arrest even the most severe septic intoxication.

In the development of sepsis with the bullet wounds special role plays, in the opinion of I. G. Rufanov, the intoxication of organism as a result of absorbing the decay products of necrotic tissues.

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Therefore the wound sepsis of wartime as predominantly infectious-toxic is larger part without metastases (septicemia) in contrast to the sepsis of peacetime, which takes place more frequent with the metastases (septicopyemia).

In the Great Patriotic War was frequently encountered the special type of the course of postwound infection, which is

characterized by the preponderance of the expressed depletion with the heavy atrophic changes in the organs/controls and the tissues analogous with traumatic consumption, indicated by N. I. Pirogov. These complications is conventionally designated as the traumatic depletion: it flowed/occurred/lasted in the edematic and dry sand mold. Surgeons' majorities it was inclined to consider traumatic depletion the manifestation of sepsis; therefore in a number of complications of the sepsis of the bullet breaks of the bones of extremities will be examined this form.

As is known, by the clinical course is distinguished (I. G. Rufanov) the lightning, sharp/acute, subacute, chronic and relapsing/recidivism/recidivist/recidivity form of sepsis.

Based on materials of author's development, complication of the lightning and sharp/acute form of sepsis during 5-10 days from the moment/torque of clinical manifestation they led to death of injured people with the bullet break of the bones of extremities. The lightning course of sepsis in injured people was observed in the foremost stages of evacuation. In separate injured people the late manifestation of lightning sepsis was caused by the undertaken in the back evacuation hospitals searches of foreign bodies or by the reposition of scrap.

The septic complications in the subacute form of duration from 20 days to 2 months were finished predominantly with the recovery of injured people.

The prolonged course of chronic sepsis, in the limits of 2-3 months, it was noted mainly in the deep rear on the soil of further complications of infection and it more frequently led injured people to death.

According to I. M. Tal'mana, the pattern of the flow of sepsis was connected with the period of the development of complication from the moment/torque of injury. The sharply current sepsis was finished measured injured people, that began in the period from 2 to 10 days from the day of injury, subacute sepsis appeared from 16 days to 2 months from the day of injury and chronic sepsis - from 2 and more than months from the day of injury. Sepsis was connected with the bullet breaks mainly with the sharp/acute necrosis of bone marrow. Therefore the earliest manifestation of sepsis could be observed with the bullet breaks of shoulder, bones of forearm and shin by the force of more surface than on the thigh of the arrangement of the crushed bones and presence therefore favorable conditions for the development of the suppurative infection (see Table 111).

The special features/peculiarities of the course of the wound

sepsis of wartime include the preponderance of the subacute and chronic forms of sepsis on the soil of lasting festering and necroses. This flaccid course in many injured people corresponded to the general unfavorable wartime conditions, which lowered the reactivity of organism. As the clinical examples, which characterize the course of the septic complications of the bullet breaks of the bones of extremities, are given the following observations.

The X, 41 year it is injured 25/XI 1942. Perforating fragmentation injury of upper third of right thigh with the damage to bone and the tangential fragmentation injury of the soft tissues of left shin.

First aid is shown/rendered by the medical orderly the hour after injury. On DMP through the days under the local anesthetization 0.25o/o solution of novocaine produced the dissection of wounds; is superimposed bandage with 2o/o chloramine and Diedrich splint. Injured person was situated 8 days in army PPG, and then was evacuated into the front evacuation hospital where into the day of admission, 5/ XII, stated/established heavy state. Pulse of 84 shocks per minute. Tongue is lined, dry, thigh edematic.

Under ether anesthesia is produced the amputation in upper third of right thigh, higher than the level of amputation are opened the flows of pus. Wound is filled by streptocide, is superimposed bandage. 6/XII temperature of 36.8-37.6°, state heavy, lines of face are sharpened, pulse weak. Blood: Hb 32o/o, colored indicator -0.7, eras. 2280000, l. 3760, m. 1o/o, S. 3o/o, p. 29o/o, s. 59o/o, lymphs. 4o/o, mon. 4o/o. 7/XII temperature of 37.3-38.4°, darkened consciousness, pulse of weak filling.

8/XII into 13 injured people it passed away. Autopsy was not conducted.

This course of the complication of bullet break is characteristic for the lightning sepsis.

K., 28 years, it is injured 9/IV 1943. Diagnosis: the blind-end fragmentation injury of middle third of left forearm with the damage of bones. Perforating fragmentation injury of upper third of left forearm with the damage of elbow joint.

During the same day on DMP to injured person is poured the blood in a quantity of 250 ml, to the wound is superimposed the bandage with the ointment of Vinyovskiy and the splint of Cramer to the left hand.

10/IV injured person is evacuated in PPG. 12/IV were noted pains in the wound. General state of the injured person of average/mean severity. Forearm edematous, skin reddened and moderately strained. The discharge of wounds is suppurative. To the wound is superimposed the bandage with 0.25% solution of potassium permanganate.

15/IV temperature of 37.8-38.3°. Is held the swelling of forearm. In the region of elbow joint, in upper third and in middle third of forearm of wound by the size/dimension 5x4 of cm. On the forearm and the shoulder is superimposed circular gypsum bandage.

16/IV temperature of 37.8-38.8°. In the injured person was twice the vomiting, were held pains in the hand.

During the subsequent days the injured person was continued to run a fever; therefore 24/IV gypsum bandage was taken/removed; it is discovered, that the swelling considerably decreased; from the wound with pus were secreted fine/small bone fragments. Is again superimposed circular gypsum bandage.

3/V injured person is evacuated into the evacuation hospital. The general state is heavy. Left forearm was the filled with pus and

sequestrations sack. Repeated hemorrhages from the wounds. To injured poured 450 ml of the blood.

Under ether anesthesia is produced the amputation of shoulder in lower third; wound is filled by streptocide, is superimposed bandage.

4/V temperature of 38.3-40.6°; the phenomenon of spilled bronchitis. In the wound necrotic sections. Wound is washed below 20/o peroxide of hydrogen, is superimposed bandage with Viwnyovskiy's ointment.

6/V temperature of 37.5-39.3°, pulse of 132 shocks per minute. Are intravenously introduced 10.0 40o/o of solution of urotropin.

7/V injured person is stunned, appeared Kernig's symptom.

The analyses of urine injured K.

(1) Дата	(2) Удельный вес	(3) Реакция	(4) Белок	(5) Эритроциты	(6) Лейкоциты
3/V	1017	(7) Кислая	(8) Следы	(9) Единичные в поле зрения 30—40	(9) Единичные в поле зрения 25—30
28/V	1010	—	—	0	0—1
30/VII	1010	—	—		

Key: (1). Date. (2). Specific gravity/weight. (3). Reaction. (4). Protein. (5). Erythrocytes. (6). Leukocytes. (7). Acid. (8). Traces. (9). Single in field views.

Analyses of the blood injured K.

(1) Дата	(2) Hb (в %)	(3) Эритроциты	(4) Цветной по. азв-тель	(5) Л.	(6) Э.	(7) П.	(8) С.	(9) Лимф.	(10) Моно.
(11) (в процентах)									
3/V	55	2 950 000	0,9	13 400	2	11	70	14	3
11/V	50	2 620 000	0,96	—	4	4	67	22	3
3/VII	55	3 000 000	—	7 200	—	—	—	—	—

Key: (1). Date. (2). (in %). (3). Erythrocytes. (4). Colored indicator. (5). l. (6). E. (7). P. (8). s. (9). Lymphs. (10). Mon. (11). (in percentages).

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9/V temperature of 37.5-37.8°. General state somewhat better. Bandage got wet by pus. Is continued treatment by the intravenous infusion 40o/o urotropin.

11/V temperature of 37.1-37.8°. In the injured person was at night pouring perspiration. Appeared appetite.

12/V temperature of 36.9-37°. The general state is satisfactory. Wounds with the flaccid granulations and scanty suppurative discharge, are washed below physiological solution.

13/V the general state was improved, the pulse of 96 shocks per minute. Chair/stool after enema.

14/V temperature of 36.3-37.3°. Granulations in the wound rose-colored. To injured person is assigned fault, streptocide and vitamins.

Subsequently the state of injured person continued to be improved, but 4/VI in the evening rose temperature to 37.8°, was discovered suppurative flow.

Under the local anesthesia sections/cuts along the front/leading and back of the stump of shoulder opened suppurative flows, wounds are closed with bandage with Viwnyovskiy's ointment.

8/VI in the X-ray photograph is determined terminal osteomyelitis of stump.

22/VI temperature of 36.3-36.8°. Injured person, who was in satisfactory state, was evacuated into the rear.

Reference data of the analyses of the urine and blood to the different periods of clinical course are given above.

12/VIII it is discharged on the recovery.

It is necessary to assume that the clinical course of bullet break in wounded k. was complicated by subacute sepsis.

R., 31 year, is injured 2/X 1944. Diagnosis: the perforating bullet injury of middle third of left thigh from break bone. First aid is shown/rendered by way of mutual assistance immediately after injury. On PMP after 6 hours is made the dressing and immobilization a splint. After 20 hours the injured person is delivered on DMP where it is determined the shock of the second degree. Wounds on the posterior and anteroexternal side of thigh by the size/dimension 1x1.5 of cm. Edematic and strained tissues. Is produced the transfusion 500 ml of blood, under ether anesthesia the dissection of wounds and the carving of the crushed tissues, is superimposed the

Diedrich splint. To the wound 4/X it is converted in PPG, where the temperature in it to 7/X was held in limits of 37.3-38.5°.

9/X temperature of 39.1-40°. Is discovered right pneumonia. Bandage got wet by pus with the ichorous odor. Into the wound is inserted the drainage.

To 25/X the temperature was held in limits of 38.1-39°, sometimes heaving to 40°. State heavy; the tongue of dry; the chair/stool liquid, involuntary.

With the fluoroscopy 25/X is established/installed fragmented break with large diastasis of scrap. Treatment - dressing, inside streptocide on 1.04 times a day.

26/X under ether anesthesia the operation/process: wounds are expanded, removed free bone fragments, cleaned up scrap, wounds are powdered by streptocide. Is superimposed hip anechoic gypsum bandage.

The morphology of the blood injured R.

(1) Дата	(2) Нб (в %)	(3) РОЭ (в миллиметрах в час)	(4) Л.	(5) Э.	(6) П.	(7) С.	(8) Лимф.	(9) Моно.
(9a) (в процентах)								
1944		(10)						
23/X	43	Высокая	15 400	1	11	64	20	4
15/XI	43	42	8 200	0	23	47	26	4
5/XII	65	42	14 200	0	17	58	23	2
12/XII	43	48	9 000	1	22	42	31	4
20/XII	38	60	11 400	1	23	53	20	3
29/XII	48	27	8 400	—	16	34	44	6
1945								
17/I	56	28	8 400	2	12	50	31	5
22/II	60	45	9 200	4	8	50	30	8
6/III	61	47	7 200	7	5	43	40	5
4/VIII	65	8	6 800	—	—	—	—	—

Key: (1). Date. (2). (in %). (3). ROE (in millimeters per hour). (4). L. (5). E. (6). P. (7). S. (8). Lymphs. (9). Mon. (9a). (in the percentages). (10). High.

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26/X on 23/XI the injured person was continued to run a fever, temperature of 37.8-39°. Chair/stool was frequent, liquid. 23/XI is cut on the gypsum bandage window, are moved apart edge wounds, moreover was secreted much pus; was introduced into the wound streptocida in the powder, and window in the bandage is newly plastered.

25/XI was interrupted diarrhea.

27/XI is produced the transfusion 220 ml of blood.

To 7/XII in change state it was not. Is changed the gypsum bandage: during the expansion of wound issued from dense pus. Is assigned the therapeutic exercise.

Subsequently gradually the state of patient was improved, although the temperature rises to 39° were noted by times also during March. During April and during May the temperature remained subfebrile, and then arrived at the norm.

9/VIII 1945 it is discharged home with the false joint of left thigh.

Observational data can serve as an example of the prolonged course (8 months) of the sepsis, which assumed the chronic relapsing/recidivism/recidivist/recidivity form and nevertheless ending by recovery.

Are different the forms of sepsis in different stages of evacuation they were encountered not equally not frequently, as is evident in injured people with the break of thigh (Table 128).

In the front region with the breaks of thigh among the injured people who subsequently died, considerably predominated septicemic forms and rarely was encountered traumatic depletion, in the administrative area only insignificantly predominated septicemic forms and considerably more frequently was observed traumatic depletion.

Based on materials of author's development, which relate to the bullet breaks of the bones of extremities, both in those survived and in dead injured people also predominated the forms of sepsis without the metastases (Table 129).

The analyses of urine injured R.

(1) Дата	(2) Реакция	(3) Белок	(4) Лейкоциты	(5) Прозрачность	(6) Удельный вес
1944 г.	(8) Кислая	0,1	5	(9) Прозрачная	1 023
24/X	(10) Щелочная	—	0—10	(11) Мутная	1 014
15/XI	,	(12) Следы	2	,	1 007
15/XII					
1945 г.					
12/I	(13) ,	,	—		1 018
5/II	Амфотерная	0	0—4	(14) ,	1 015
6/III	(15) Кислая	0	—	Прозрачная	1 015

Key: (1). Date. (2). Reaction. (3). Protein. (4). Leukocytes. (5). Transparency. (6). Specific gravity/weight. (7). No key. (8). Acid. (9). Transparent/hyaline. (10). Alkaline. (11). Turbid. (12). Traces. (13). Amphoteric. (14). Acid. (15). Transparent/hyaline.

Table 128. Forms of sepsis with the bullet break of thigh according to different authors' sectional data (in the percentages).

(1) Автор	(2) Район наблюдения	(3) Форма сепсиса		
		(4) Септи- цемия	(5) Септико- пиемия	(6) Травматиче- ское исто- щение
(7) В. Л. Бялик	(8) Фронтальной	81,5	14,4	4,1
(9) А. В. Каплан	(10) ,	77,8	22,2	—
(11) А. П. Авцын	(12) Тыловой	48,0	39,2	12,8

Key: (1). Author. (2). Region of observation. (3). Form of sepsis. (4). septicemia. (5). septicopyemia. (6). traumatic depletion. (7). V. L. Byalik. (8). Front. (9). A. V. Kaplan. (10). A. P. Avtsyn. (11). Back.

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It is necessary to note the very heavy course of sepsis with the metastases.

The more frequent detection of septicemic forms in comparison with septicopyemic is explained not so much by difference as by the preponderance of the necrobiotic processes above the inflammatory ones.

In injured people with bullet fracture of the bones of extremities, complicated sepsis, was observed different temperature reaction. With the full/total/complete clinical picture of sepsis in some temperatures it was predominantly hectic, in others - by subfebrile, in the third it was held at the normal or sub-normal level. In majority was noted the transient character/nature of the temperature reaction when temperature, previously held on the high numerals, began then to be reduced in the deteriorating general state.

The character/nature of temperature reaction is represented in Table 130 (based on materials of author's development).

In the course of the septic complications of the bullet breaks

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predominated hectic temperature reaction, which corresponded to the course of sepsis predominantly without the metastases.

Table 129. Distribution of injured people with the bullet break of the bones of extremities, complicated by sepsis, according to the forms of sepsis (in the percentages).

(2) Локализация перелома	(1) Форма сепсиса			(5) Всего
	(3) С метастазами	(4) Без метастазов		
(6) Плечо	30,6	69,4		100,0
(7) Предплечье	25,0	75,0		100,0
(8) Бедро	13,3	86,7		100,0
(9) Голень	14,0	86,0		100,0

Key: (1). Form of sepsis. (2). Localization of break. (3). With metastases. (4). Without metastases. (5). In all. (6). Shoulder. (7). Forearm. (8). Thigh. (9). Shin.

Table 130. Distribution of injured people with the bullet break of the bones of extremities, complicated by sepsis, according to the character/nature of temperature reaction (in the percentages).

(2) Характер температуры	(1) Локализация перелома				(6) Голень
	(3) Плечо	(4) Предплечье	(5) Бедро		
(7) Гектическая	87,9	90,9	52,7		62,7
(8) Субфебрильная	9,1	9,1	37,8		31,0
(9) Нормальная и субнормальная	3,0	—	9,5		6,3
(10) Всего	100,0	100,0	100,0		100,0

Key: (1). Localization of break. (2). Character/nature of temperature. (3). Shoulder. (4). Forearm. (5). Thigh. (6). Shin. (7).

Hectic. (8). Subfebrile. (9). Normal and sub-normal. (10). In all.

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Unexplained from entire material remained temperature reaction in 5.00/o of injured people with the bullet break of the bones of shin and in 47.00/o - with the break of the bones of forearm.

Among the injured people with the bullet break of the bones of extremities, complicated by sepsis, are revealed also such, whose sepsis flowed/occurred/lasted against the background of traumatic depletion; apathy and adynamia were accompanied in them by larger partly normal and sub-normal temperature, and the injured people in whom were observed chills, delirium, excitation, they had high temperature.

The frequency of the enumerated symptoms, based on materials of author's development, is represented in Table 131.

To the special features/peculiarities of the course of sepsis with the bullet breaks of the bones of extremities it is necessary to relate another reaction of organism to the metastatical forms which in contrast to the sepsis of peacetime were predominantly accompanied by hectic temperature with the vomiting, delirium, chill, that also it

is possible to explain by the preponderance of necrotic processes with the bullet breaks above the inflammatory ones.

Very peculiar was also the character/nature of temperature curve with the complications of sepsis of diarrhea and secondary hemorrhage.

The septic diarrheas, which met, based on materials of author's development, in 40.00/o of injured people the bullet break of thigh, which were complicated by sepsis, and in 25.00/o of injured people with the break of the bones of upper extremities, were accompanied by the following temperature reaction (Table 132).

Table 131. Frequency of the separate symptoms of sepsis with the bullet breaks of the bones of extremities (in the percentages).

(2) Симптом \ (1) Локализация перелома				
	(3) Плечо	(4) Предплечье	(5) Бедро	(6) Голень
(7) Озноб	12,1	13,3	9,0	17,0
(8) Эйфория	3,0	—	8,0	—
(9) Вялость	—	—	1,4	—

Key: (1). Localization of break. (2). Symptom. (3). Shoulder. (4). Forearm. (5). Thigh. (6). Shin. (7). Chill. (8). Euphoria. (9). Apathy.

Table 132. Distribution of injured people with the bullet break of the bones of extremities, complicated by septic diarrhea, according to the character/nature of temperature reaction (in the percentages).

(2) Характер температуры \ (1) Локализация перелома				
	(3) Плечо	(4) Предплечье	(5) Бедро	(6) Голень
(7) Гектическая	70,0	100,0	53,0	58,0
(8) Субфебрильная	30,0	—	35,0	37,0
(9) Нормальная и субнормальная	—	—	12,0	5,0

Key: (1). Localization of break. (2). Character/nature of temperature. (3). Shoulder. (4). Forearm. (5). Thigh. (6). Shin. (7). Hectic. (8). Subfebrile. (9). Normal and sub-normal.

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Somewhat more than the half injured people with the bullet break of the bones of lower extremities and considerable majority with the break of the bones of upper extremities in the presence of septic diarrhea had during disease/sickness/illness/malady high temperature - in one third of injured people diarrheas they were accompanied by subfebrile temperature in the small part of the injured people with the bullet break of the bones of lower extremities - normal and sub-normal.

It is at the same time necessary to note that the diarrheas were observed in 70.00/o of injured people with the bullet break of thigh and bones of shin, complicated by the sepsis, which flowed/occurred/lasted at a normal and sub-normal temperature.

The secondary septic hemorrhages, which met, based on materials of author's development, in 15.00/o of injured people the break of the bones of lower extremities and in 15.50/o of injured people with the break of the bones of upper extremities, were accompanied by the following temperature reaction (Table 133).

Thus, septic hemorrhages on the lower extremities were observed predominantly in injured people with the hectic temperature, and in

injured people with the break of shoulder - in the presence of the subfebrile temperature reaction.

Sepsis was accompanied by the very numerous symptoms which complicated the clinical picture of basic disease. A. V. Melnikov divided sepsis into the groups in accordance with that effect which exerted this infection to the separate organs/controls and the tissues (liver, heart, intestine, respiratory organs, general state, etc.). Based on materials of M. Ye. Bokshteyn, in 25.0-50.0o/o of injured people with the septic complication of the bullet breaks of thigh was observed pneumonia. M. I. Kuslik in 19.0o/o of injured people noted phlegmon and flows, also, in 15.4o/o - thrombophlebitis.

Different symptoms of sepsis, based on materials of author's development, added to its course the character/nature first of pneumonia, then of diarrheas, then of complications from the side of vessels, then the combination of complications and so forth (Table 134).

The local complications, which relate to the injured extremity with the bullet breaks, are represented in Table 135 (based on materials of author's development).

To the special features/peculiarities of the manifestation of

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sepsis should be related not so much the presence of any of the enumerated symptoms or even several ones of them, as characteristic for the clinical picture of sepsis sharp disturbance/breakdown of the general state of injured person.

Table 133. Distribution of injured people with the bullet break of the bones of extremities, complicated by septic hemorrhage, according to the temperature reaction (in the percentages).

(2) Характер температуры	(1) Локализация перелома		
	(3) Плечо	(4) Бедро	(5) Голень
(6) Гектическая	20,0	64,0	64,0
(7) Субфебрильная	80,0	36,0	36,0
(8) Итого . . .	100,0	100,0	100,0

Key: (1). Localization of break. (2). Character/nature of temperature. (3). Shoulder. (4). Thigh. (5). Shin. (6). Hectic. (7). Subfebrile. (8). Altogether.

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Majority of the enumerated in Table 135 complications of sepsis in the clinical manifestation differed little from similar complications, which were being encountered without the presence of sepsis. However, septic diarrheas carried characteristic, differing from the diarrheas of another etiology features. Thus, with the septic diarrheas there are no tenesmuses. Frequently in the defecations was detected the admixture/impurity of the blood as a result of the development of nonspecific ulcers on the wall of the lower division of the large intestine. In similar cases it was not to

be, of course, forgotten about the possibility of dysentery as this was once revealed by the author among the injured people with the bullet break of thigh in one of the hospitals and by the confirmed bacteriological investigations. However, more frequent discussion dealt with the septic diarrhea which could be erroneously estimated as dysentery.

The diagnosis of flows and phlegmons feast treatment by anechoic gypsum bandage was difficult, and only the removal/taking of gypsum bandage made it possible to more accurately establish/install localization of focus. The timely establishment of readings to the autopsy of gypsum bandage depended on power of observation and experience of the doctor in attendance. Nonlowering temperature, the loss of appetite, pain in the wound could not pass by doctor's attention and served as basis to the removal/taking of bandage for the target the revisions of wound.

Representation about the propagation of flows give Table 136 and 137 (based on materials of author's development).

Table 134. Frequency of the diseases of internal organs/controls in injured people with the bullet break of the bones of extremities, which were complicated by sepsis (in the percentages).

(2) Локализация перелома	(1) Название болезни	(3) Пневмония	(4) Плеврит	(5) Пиелит	(6) Энтероколит	(7) Желтуха
(8) Плечо		22,0	5,0	—	27,0	—
(9) Предплечье		20,0	10,0	—	15,0	—
(10) Бедро		26,0	10,0	2,0	40,0	4,0
(11) Голень		29,0	4,0	—	34,0	10,0

Key: (1). Name of disease/sickness/illness/malady. (2). Localization of break. (3). Pneumonia. (4). Pleurisy. (5). Pyelitis. (6). Enterocolitis. (7). Jaundice. (8). Shoulder. (9). Forearm. (10). Thigh. (11). Shin.

Table 135. Frequency of local complications in injured people with the bullet break of the bones of extremities, complicated by sepsis (in the percentages).

(2) Локализация перелома	(1) Осложнение	(3) Рожь	(4) Остеомиелит	(5) Вторичный артрит	(6) Гнойный затек	(7) Тромбофлебит	(8) Тромбоз артерий	(9) Вторичное кровоотечение
(10) Плечо		—	11,0	13,0	48,0	15,0	—	16,0
(11) Предплечье		5,0	15,0	5,0	40,0	15,0	—	15,0
(12) Бедро		2,0	49,0	13,0	53,0	10,0	—	16,0
(13) Голень		—	23,0	26,0	33,0	19,0	4,0	13,0

Key: (1). Complication. (2). localization of break. (3). Erysipelas. (4). Osteomyelitis. (5). Secondary arthritis. (6). Suppurative flow.

(7). Thrombophlebitis. (8). Thrombosis of arteries. (9). Secondary hemorrhage. (10). Shoulder. (11). Forearm. (12). Thigh. (13). Shin.

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As can be seen from Tables 136 and 137, the mechanism of onset and propagation of flows is connected predominantly with topographic-anatomic relations (see vol. 15, pg. 345, 476, etc.), the place of the introduction of infection and further motion of pus along gravitational force. Actually/really, with the breaks of thigh and shin as a result of the elevated position of lower extremity in the process of the treatment of break the flows had a tendency to be spread from the place of damage upwards to the thigh and to the nates. With the breaks of shoulder due to the usually omitted position its flows were spread down into the cubital pit and it is further on the forearm. On the contrary, with the breaks of the bones of forearm in connection with its elevated position in the splint flows were inclined were inclined to be spread from the place of break upwards.

It was difficult to diagnose thrombophlebitis, which especially developed in the presence of edemas on the soil of heart weakness the silt of the edematic form of traumatic depletion. Correct alignment helped the determination of morbid cord-like packing/seal from the

course of vascular bundle.

With the complicated by sepsis bullet breaks of shoulder and bones of forearm were surprised deep veins in 15.00/o, all on the spot of break; with the breaks of shoulder, furthermore, one injured person had thrombophlebitis also of surface wounds.

Thrombophlebitis, based on materials of author's development, with the bullet breaks of thigh, complicated by sepsis, occurred in 15.00/o of injured people. If all complications of thrombophlebitis are accepted for 100, then to the femoral vein are 57, to the external iliac vein - 28, to the lower hollow vein - 10 and to the mesenteric veins - 5. Thus, predominantly were surprised the nearest to the bullet break sections of veins.

Table 136. Distribution of flows according to their arrangement with the complication of the sepsis of the bullet breaks of the bones of upper extremity (in the percentages).

(2) Локализация перелома	(1) Расположение затека							
	(3) В ране	(4) Под грудной мышцей	(5) В подмышечной ямке	(6) Вверх от раны на плече и предплечье	(7) В локтевой ямке	(8) Вниз от раны на плече и предплечье	(9) Всего	(10) Затек от суставов
(11) Плечо	36,0	10,0	10,0	4,0	13,0	27,0	100,0	50,0
(12) Предплечье	86,0	—	—	14,0	—	—	100,0	80,0

Key: (1). Arrangement of flow. (2). Localization of break. (3). In wound. (4). Under thoracic muscle. (5). In subaxillary pit. (6). Upwards from wound on shoulder and forearm. (7). In cubital pit. (8). Down from wound on shoulder and forearm. (9). In all. (10). Flows were absent. (11). Shoulder. (12). Forearm.

Table 137. Distribution of flows according to their arrangement with the complication of the sepsis of the bullet breaks of the bones of lower extremities (in the percentages).

(2) Локализация перелома	(1) Расположение затека							
	(3) В ране	(4) На брюшной стенке	(5) На ягодице	(6) Вверх от раны на бедре и голени	(7) Вниз от раны на бедре	(8) В суставе	(9) Итого	(10) Затек от суставов
(11) Бедро	43,0	6,0	3,0	12,0	6,0	30,0	100,0	47,0
(12) Голень	40,0	3,0	3,0	24,0	—	30,0	100,0	67,0

Key: (1). Arrangement of flow. (2). Localization of break. (3). In wound. (4). On abdominal wall. (5). On nates. (6). Upwards from wound on thigh and shin. (7). Down from wound on thigh. (8). In joint. (9).

Altogether. (10). Flows were absent. (11). Thigh. (12). Shin.

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According to the data of A. P. Avtsyn, in 190 dead sections with the bullet break of thigh thrombophlebitis was noted on the injured extremity in 38.60/o and on the healthy/sound extremity - in 5.70/o of dead persons. From a number of thrombophlebitides on the sick extremity, accepted as 100.00/o, thrombophlebitis of femoral vein composed 50.30/o, iliac - 29.80/o, lower hollow vein - 14.80/o, the fine/small veins of pelvis - 3.90/o, all veins of extremity - 1.20/o.

With the septic complications of the bullet breaks of the bones of shin, based on materials of author's development, thrombophlebitis occurred and 19.00/o of injured people; moreover were always surprised deep veins.

As a result of the difficulty of the development/detection of thrombophlebitis of thigh with the life it in the significant part of the injured people was identified only in the section.

According to A. P. Avtsyn, with the life thrombophlebitis was established/installed only in 33.80/o of injured people. The periods of the development/detection

of septic thrombophlebitis after injury are represented following data of author's development (Table 138).

Thus, with the breaks of thigh thrombophlebitis in the section was diagnosed 2 times more frequently than with the life. Thrombophlebitis with the breaks of the bones of shin and upper extremity was identified in all injured people with the life. The special features/peculiarities indicated are explained by the more surface, than on the thigh, arrangement of veins on the shoulder, the forearm and the shin.

Septic hemorrhages were detected usually by the general/common/total symptoms of anemia and by the soaking with the blood of bandage. The period of the onset of septic hemorrhages from the moment/torque of injury is characterized by Tables 139 (based on materials of author's development).

Table 138. Distribution of injured people with the bullet break of the bones of extremities, complicated by sepsis, according to the periods of the development/detection of thrombophlebitis (in the percentages).

(2) Локализация перелома	(1) Срок выявления тромбоза	(3) При жизни			(7) На сечении	(8) Всего
		(4) до 10 дней	(5) от 11 дней до месяца	(6) свыше месяца		
(9) Плечо		28,0	44,0	28,0	—	100,0
(10) Предплечье		33,0	33,0	34,0	—	100,0
(11) Бедро		19,0	5,0	10,0	66,0	100,0
(12) Голень		50,0	45,0	5,0	—	100,0

Key: (1). Period of the development/detection of thrombophlebitis. (2). Localization of break. (3). With life. (4). to 10 days. (5). from 11 days to month. (6). it is more than month. (7). In section. (8). In all. (9). Shoulder. (10). Forearm. (11). Thigh. (12). Shin.

Table 139. Period of the onset of septic hemorrhages with the bullet breaks of the bones of extremities (in the percentages).

(2) Локализация перелома	(1) Срок возникновения кровотечения	(3) До 10 дней	(4) От 11 дней до месяца	(5) Свыше месяца	(6) Всего
		(3) До 10 дней	(4) От 11 дней до месяца	(5) Свыше месяца	(6) Всего
(7) Плечо		20,0	20,0	60,0	100,0
(8) Предплечье		34,0	66,0	—	100,0
(9) Бедро		13,0	67,0	20,0	100,0
(10) Голень		54,0	46,0	—	100,0

Key: (1). Period of the onset of hemorrhage. (2). Localization of break. (3). To 10 days. (4). From 11 days to month. (5). It is more than month. (6). In all. (7). Shoulder. (8). Forearm. (9). Thigh.

(10). Shin.

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The absence of late septic hemorrhages with the breaks of the bones of forearm and shin is explained by the fact that on these segments with the complication of breaks of sepsis the amputations were conducted considerably more frequent, also, within the earlier periods than with the breaks of shoulder and thigh (Table 146).

Septic hemorrhages in the majority of injured people appeared suddenly; however, as the occasion for the hemorrhage sometimes served dressing or probing of wound.

The intensity of hemorrhage was different depending on the bore of the bleeding vessel. As the illustration of the severity of hemorrhage can serve following data from the materials of the author's development: whereas the first septic hemorrhage with the bullet breaks of thigh in each fifth injured person proved to be fateful. In the third part of the injured people the hemorrhage was repeated from 2 to 7 times.

For the diagnosis of sepsis in the therapeutic institutions of the stages of the medical evacuation as essential help served the

laboratory analyses: the clinical investigation of urine, blood, pus.

Changes in the urine with the wound sepsis, according to A. V. Melnikov's data, consisted of a decrease in the specific gravity/weight; urine acquired alkaline reaction. N. K. Nakaryakov with septic osteomyelitis determined in the urine of squirrels in 69.20/o of injured people and the blood in 24.30/o.

The most significant changes in the urine, according to the data of the materials of author's development, proved to be in injured people with the bullet break of thigh, complicated by sepsis (Table 140). Deviations consisted of a reduction in the specific gravity/weight, the appearance of alkaline reaction, protein and erythrocytes in a considerable number of injured people.

Changes in the blood with the sepsis in injured people with the bullet break of thigh, according to V. G. Weinstein's data within the period of war with White Finns (1939-1940), were expressed in leukocytosis - to 14000-16000 initially and at the erosion/climax of sepsis; with the heavy forms in the terminal period - in leucopenia. Was increased a quantity of neutrophilic leukocytes and young forms. According to N. N. Askalonov, in 21.90/o of injured people with the bullet break of thigh, complicated by sepsis, hemoglobin was reduced to 40o/o, but in its 48.70/o quantity was not more than 50o/o. With

septic osteomyelitis N. K. Nakaryakov noted the decrease of a quantity of hemoglobin to 30% and is below, and also the shift/shear of leukocyte formula to the left (in 61.7% of injured people) and the disappearance of eosinophils (in 9.4%). Ye. M. Liozina with the sepsis found in the blood in the injured people of the change, which corresponded to a change in the blood during the general/common/total infections. According to her data, in the first period of sepsis appeared the neutrophilic phase of fight, the secondly - monocytic shielding reaction, in the third period - during the phase of recovery - lymphocytic reaction.

Table 140. change in the urine in injured people with the bullet ones by the break of the bones of extremities, complicated by sepsis (on 100 inspected injured people).

(2) Локализация перелома	(1) Изменения в моче	(3) Снижение удельного веса	(4) Щелочная реакция	(5) Белок	(6) Эритроциты	(7) Лейкоциты единичные	(8) Цилиндры
(9) Плечо		14,3	—	23,8	19,0	9,5	—
(10) Бедро		77,4	50,0	67,7	56,4	—	—
(11) Голень		15,8	22,7	33,3	18,1	—	6,8

Key: (1). Changes in the urine. (2). Localization of break. (3). Reduction in specific gravity/weight. (4). Alkaline reaction. (5). Protein. (6). Erythrocytes. (7). Leukocytes (single. (8). Cylinders. (9). Shoulder. (10). Thigh. (11). Shin.

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In the investigations of the morphology of the blood are noted the quantitative and qualitative shifts/shears of different indicators (Table 141, based on materials of author's development).

As can be seen from Table 141, for the septic process are characteristic the following indicators of a change in the blood: accelerated ROE, especially with the bullet break of thigh, together with the quantitative decrease of hemoglobin and erythrocytes, qualitative disturbances/breakdowns from the side of the red blood in the form of hypochromic anemia and anisocytosis with poikilocytosis; an increase in the quantity of leukocytes. In some injured people, however, is noted leucopenia, predominantly in the areactive phase of the terminal period of sepsis. Leukocyte formula was characterized by left-shift, i.e., by an increase in neutrophilia with the advent of stabnuclear and young forms. In the blood disappeared the eosinophils.

During the bacteriological investigation in to pus of injured

people with the bullet break the thighs, complicated by sepsis, according to V. G. Weinstein's data, within the period of war with the White Finns 1939-1940 found in 70.00/o of injured people anaerobic flora. 75.00/o of aerobes comprised staphylococci and less frequent streptococci. During the favorable course the anaerobes were changed by the hemolytic streptococcus which was held 4-6 weeks, being inferior subsequently to nonhemolytic streptococcus and finally to staphylococcus. On the contrary, in injured people, subsequently dead persons, hemolytic streptococcus was continued firmly to remain in to pus. Seedings/inoculations of the blood of bacterial flora not of distance.

V. A. Krestovnikova, O. M. Taratorina and A. I. Gorokhovnikova with the wound sepsis the presence of break independent of found two basic groups of the causative agents of the severe festering: *Streptococcus pyogenes* and *Streptococcus faecalis* (enterococcus). Flora pus of wounds in many respects resembled intestinal, among whom main place they occupied. V. *Proteus vulgaris* and *B. perfringens*.

Table 141. Changes in the morphology of the blood in injured people with the bullet break of the bones of extremities, complicated by sepsis (in the percentages).

Локализация перелома		Плечо (3)	Бедро (4)	Голень (5)
Характер изменения отдельных показателей (1)	(2)			
РОЭ	Ускоренная (6)	25,0	100,0	42,0
	Нормальная (7)	17,8	—	5,0
	Нет данных (8)	57,2	—	53,0
(8a) Гемоглобин	Уменьшение процента (9)	33,9	88,5	56,0
	Нормальный процент (10)	1,8	13,5	4,0
	Нет данных (11)	64,3	—	40,0
(12) Эритроциты	Пониженное число (13)	37,0	60,0	51,0
	Нормальное число (14)	3,6	6,0	5,0
	Нет данных (11)	59,4	34,0	44,0
(15) Лейкоциты	Пониженное число (13)	17,8	12,3	1,0
	Нормальное число (14)	14,2	—	19,0
	Повышенное число (16)	25,0	87,7	40,0
	Нет данных (11)	43,0	—	40,0
(17) Лейкоцитарная формула	Сдвиг влево (18)	37,3	28,7	45,0
	Сдвига нет (19)	—	—	17,0
	Нет данных (8)	62,7	71,3	38,0

Key: (1). Character/nature of a change in the separate indicators.

(2). Localization of break. (3). Shoulder. (4). Thigh. (5). Shin.

(6). Accelerated. (7). Normal. (8). There are no data. (8a).

Hemoglobin. (9). Decrease of percentage. (10). Normal percentage.

(11). There are no data. (12). Erythrocytes. (13). Lowered/reduced

number. (14). Normal number. (15). Leukocytes. (16). Increased

number. (17). Leukocyte formula. (18). Left-shift. (19). There is no shift/shear.

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By their toxins these causative agents impeded the healing of wound, activating/promoting moreover, and other pathogenic microbes. In view of the preponderance in to pus of the causative agents of rotting infection clear became unpleasant odor from the wound with the heavy sepsis.

From the special investigations it remains to examine roentgenological. To the special features/peculiarities, which are powerful to some degree of explaining the unfavorable course of wound with the heavy general/common/total disorders of septic character/nature, should be related the massive multi-fragmented breaking up of bones with the drift of fragments up to the considerable distance into soft tissues and bone marrow.

Among the injured people with the bullet break the thighs, complicated by sepsis, in whom was conducted x-ray examination, based on materials of author's development, destruction of bone for the considerable elongation/extent were noted in 20.00/o, the injuries of bones, which penetrate into the joint, in 12.00/o, the considerable displacement of scrap - in 28.00/o, the moderate destruction of bone - in 40.00/o.

At the break, which ended by the consolidation of scrap, osteomyelitic process maintained infection and activated/promoted further course of sepsis.

Treatment.

In the procedure of the treatment of sepsis with the bullet breaks of the bones of extremities in the first place must be set active surgical intervention, since from the primary focus wound sepsis continues to be activated/promoted. Therefore the accumulations of pus wherever they not were discovered, were subject to immediate emptying.

Among the operational methods of the treatment of the heavy infection of the bullet breaks with the septic course it was proposed to cut all over over wide limits suppurative wound and to immobilize extremity by gypsum.

The simultaneous trepanation of bone in such injured people on B. G. Leshchinskiy's proposition had to bare bone marrow for the large elongation/extent, which made it possible to remove affected by suppuration bone marrow. Ya. A. Bruskin and S. V. Teplov applied the wide subperiosteal resection of the section of thigh in the place of osteomyelitic focus.

Unfavorable results from the insufficiently wide and belated disclosure/expansion of the infected foci it served as basis more persistently to resort to repeated surgical interventions during the appropriate readings, and to also more frequently produce amputations. A. A. Bocharov with the bullet breaks of thigh operated on one time apropos of sepsis 44.00/o and on 2 times - 13.00/o of injured people of the number of those been killed subsequently from this complication.

According to the data of the development of the histories of disease/sickness/illness/malady, besides the primary surgical processing, repeated operations/processes were frequent intervention in injured people with the bullet break of the bones of extremities, which were complicated by sepsis (Table 142).

In injured people with the break, which were complicated by sepsis, the operations/processes were conducted (1.4 times on the thigh and 2.8 times on the forearm) more frequently than in injured people, who did not have this complication; an average number of operations/processes to one different in the group with the complication of sepsis was 1.3-1.6 times more than in the group without the complication it.

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Operational aid with the breaks, complicated by sepsis, consisted in the sections/cuts for the purpose of the emptying of ulcers, in the removal/distance of bone fragments and of foreign bodies, sequestrectomy, the dressing of vessels, amputation and other operations/processes. It was widely applied in all stages of evacuation, moreover the character/nature of operations/processes was changed in stages, as is evident from the data of development, which concern the breaks of thigh (Table 143).

In these data should be noted a change in the character/nature of operations/processes in the different stages. In the group of injured people with the bullet break of thigh, complicated by sepsis, in all stages the first place among the operations/processes occupied the amputation, which reached in front region 62.80/o. Other operations/processes oscillated in their frequency; so, in the army region after amputation stood the revision of wounds and the autopsy of ulcers, and in further stages their place it occupied sequestrectomy and reamputation. Operability in the administrative area in comparison with the army increased 1 1/2 times.

Table 142. Frequency of surgical interventions, besides the primary surgical processing, in injured people with the bullet break of the bones of extremities with the complication of sepsis and without the complication of it (in the percentages).

Локализация перелома (1)	Группа раненых (2)	Всего оперировано (3)	Среднее число операций на одного раненого (4)
Плечо (5)	С сепсисом (6)	79,6	1,8
	Без сепсиса (7)	46,3	1,4
Предплечье (8)	С сепсисом (6)	82,7	2,1
	Без сепсиса (7)	29,4	1,3
Бедро (9)	С сепсисом (6)	89,7	2,2
	Без сепсиса (7)	62,8	1,6
Голень (10)	С сепсисом (6)	86,8	2,0
	Без сепсиса (7)	59,7	1,5

Key: (1). Localization of break. (2). Group of injured people. (3).

In all it is operated. (4). Average number of operations/processes to one injured person. (5). Shoulder. (6). With sepsis. (7). Without sepsis. (8). Forearm. (9). Thigh. (10). Shin.

Table 143. Distribution of injured people with the bullet break of thigh, complicated by sepsis and by not complicated by them, according to the character/nature of the operations/processes, produced in the different regions of evacuation (in the percentages).

Район (1)	Группа раненых (2)	Название операции (3)							(10) Итого
		(4) реализация раны	(5) искрытые взрывов	(6) ампутация	(7) повторная ампутация реампутация	(8) сепэкстректомия	(9) другие		
(11) Армейский	С сепсисом (12)	24,1	18,1	43,2	14,6	—	—	100,0	
(14) Фронтальной	Без сепсиса (13)	38,3	17,4	28,8	15,5	—	—	100,0	
(15) Тыловой	С сепсисом (12)	6,8	9,6	62,8	11,8	9,0	—	100,0	
	Без сепсиса (13)	26,3	16,8	13,0	25,9	18,0	—	100,0	
	С сепсисом (12)	3,0	9,6	30,8	15,1	24,2	17,3	100,0	
	Без сепсиса (13)	8,8	5,5	2,2	10,2	50,9	22,4	100,0	

Key: (1). Region. (2). Group of injured people. (3). Name of operation/process. (4). revision of wound. (5). autopsy of flows. (6). amputation. (7). repeated amputation and reamputation. (8). Sequestrectomy. (9). others. (10). Altogether. (11). Army. (12). With sepsis. (13). Without sepsis. (14). Front. (15). Back.

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Another distribution of the character/nature of operations/processes was in the group of injured people with the break of thigh, not complicated by the sepsis: amputations not in one stage occupied the first place among other operations/processes, and their specific gravity/weight rapidly was decreased towards rear; the first place in the army and front region occupied the revision of wound and the autopsy of ulcers, in the back - sequestrectomy.

Analogous data were obtained also with the bullet breaks of the bones of shin (Table 144).

High value has also a period of the autopsy of phlegmons and flows with the sepsis (Table 145, comprised based on materials of author's development).

By the periods of production in the sections/cuts it is possible to judge what development/detection of ulcers and corresponding interventions with the sepsis on the upper extremities were conducted within the earlier periods than on the lower extremities. It is logical that the development/detection of ulcers and their sections/cuts were realized within the later periods than was determined the development of the clinical picture of sepsis.

Table 144. Distribution of injured people with the bullet break of the bones of shin, complicated by sepsis and by not complicated by them, according to the character/nature of the operations/processes, produced in the different regions of evacuation (in percent).

Район (1)	Группа раненых (2)	Название операции (3)						(10)
		(4) реви́зия раны	(5) вскры́тие вено́в	(6) ампу́тация	(7) повторная ампу́тация и реампу́тация	(8) секвестр- эктомия	(9) другое	
(11) Армейский	С сепсисом (12)	12,4	14,8	58,0	14,8	—	—	100,0
	Без сепсиса (13)	27,3	22,2	38,7	11,8	—	—	100,0
(14) Фронтальной	С сепсисом (12)	1,6	9,6	82,9	17,9	8,0	—	100,0
	Без сепсиса (13)	16,7	20,0	12,1	16,1	35,1	—	100,0
(15) Тыловой	С сепсисом (12)	—	—	19,1	49,3	15,0	16,6	100,0
	Без сепсиса (13)	4,2	4,5	0,6	17,0	61,5	12,2	100,0

Key: (1). Region. (2). Group of injured people. (3). Name of operation/process. (4). revision of wound. (5). autopsy of flows. (6). amputation. (7). repeated amputation and reamputation. (8). Sequestrectomy. (9). others. (10). Altogether. (11). Army. (12). With sepsis. (13). Without sepsis. (14). Front. (15). Back.

Table 145. Period of the autopsy of phlegmons after injury with the complicated by sepsis bullet breaks of the bones of extremities (in the percentages) .

(1) Локализация перелома	Срок в днях		15	16—30	31 и более (3)	Всего (4)
	(2)					
Плечо (5)			52,0	9,0	39,0	100,0
Предплечье (6)			75,0	13,0	12,0	100,0
Бедро (7)			21,0	44,0	35,0	100,0
Голень (8)			28,0	44,0	28,0	100,0

Key: (1). Localization of break. (2). Period in days. (3). and more.

(4). In all. (5). Shoulder. (6). Forearm. (7). Thigh. (8). Shin.

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However, in some injured by fault late sections/cuts was the gypsum bandage, which was being applied for the immobilization of lower

extremities more frequent than for the upper ones. A. M. Vysokovoy succeeded in noting the perceived by palm increase in the temperature of gypsum bandage in the place of the development of flow with the bullet breaks of the bones of shin. In the majority of injured people, however, about the developing complications of wound under the gypsum bandage it was necessary to judge by the complaints on the pain in the wound and by the general state of injured person.

Sections/cuts facilitated the state of injured person, but with their aid was not always reached recovery and subsequently nevertheless it was necessary to resort to the amputation. The results of interventions are represented by following data of author's development: after the produced sections/cuts with the septic complications of the bullet break of shoulder it got well itself by 26.10/o of injured people, bones of forearm - 14.30/o, thighs - 11.80/o and the bones of shin - 13.00/o. On those recovered after amputation it is said below (pg. 234).

Amputation with the sepsis - reasonable measure, calculated for the rescuing of injured person. Difficulty consisted in in proper time making of amputation, where this was caused by need, and not to make it, where it is possible to preserve extremity. In this respect large role played surgeon's experience, which made it possible to correctly and in proper time place diagnosis and to evaluate the

forces of injured person. The correct solution of a question helped daily observation and comparison of the symptoms of the course of bullet breaks. It was now and then for surgeon necessary to survive the agonizing doubts of the need for amputating extremity, until it was convinced of the fact that to fight with the infection by other substances is impossible. Frequently as reading to the amputation served the septic hemorrhage, which required from the surgeon of immediate solution. As an example can serve the following observation.

N., 35 years, is equal to 26/I 1944 g the diagnosis: the perforating fragmentation injury of lower third of left thigh with the break of bone, the blind-end fragmentation injury of the soft tissues of middle third of left thigh, the blind-end fragmentation injury of the soft tissues of lower third of left shoulder.

27/I in ^{KH} PPG is produced the dissection of wounds; to the left strut is superimposed the Diedrichs' splint. During February the injured person was situated in the heavy state 3/III in the evacuation hospital it was made the arthrotomy of left knee joint, was superimposed anechoic gypsum bandage, inside was assigned sulfidine on the usual scheme. 11/III it appeared the hemorrhage from the wound, discovered on the soaking by the blood of gypsum and sharp pallor of injured person. Is produced amputation on the boundary of

middle and lower third of thigh. Subsequently an improvement in the general state. During August with the healed stump the injured person is discharged home.

Amputation apropos of sepsis with the bullet break of the bones of extremities within the time of the Great Patriotic War was most frequent from the operations/processes, which were being conducted in the different stages of evacuation.

About the same communicate many authors (A. N. Berkutov, B. P. Cyril, Ya. M. Zasukhovskiy et al.).

The distribution of amputations with the sepsis in the stages of evacuation is represented in Table 146.

Table 146. The distribution of injured people with the bullet break of the bones of extremities by the complicated sepsis, according to the regions of evacuations, on which was conducted the amputation (i. the percentages).

Локализация перелома	Район			Итого	Ампутаций не производилось	Всего
	армейский	фронтальный	тыловой			
Плечо	20,4	20,4	0,2	47,0	53,0	100,0
Предплечье	26,1	47,7	4,3	78,1	21,9	100,0
Бедро	18,9	28,2	12,7	59,4	40,6	100,0
Голень	40,2	24,5	8,9	73,6	26,4	100,0

Key: (1). Localization of break. (2). Region. (3). army. (4). Front (5). back. (6). Altogether. (7). Amputations it was not conducted. (8). In all. (9). Shoulder. (10). Forearm. (11). Thigh. (12). Shin.

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From table 146 it is evident that most frequently amputated extremity with the complication of the sepsis of the breaks of bone the forearms and the shin, less frequent - thighs and shoulder. In the earlier stages (in the army region) most frequently extremity subjected to amputation with the breaks of bones the shins, most rarely - with the breaks of thigh. Thus, the saving treatment most all was applied with the breaks of thigh and shoulder.

During the separate years of war the amputation among other operations/processes with the sepsis was conducted in different stages of evacuation not equally not frequently, which is evident

from table 147.

Thus, with the course of war the specific gravity/weight of amputations among other operations/processes apropos of sepsis was increased in the army and front region and descended in the back.

The severity of course after the removal of extremity apropos of sepsis with the bullet breaks of the bones of extremities was determined to the sizable degree by such factors as the level of amputation, the distance, at which was conducted the truncation of extremity from the level of break, and the period of amputation from the day of complication.

After exarticulation of shoulder apropos of sepsis with the bullet breaks of shoulder recovered 100.00/o of injured people, after amputation in upper third - 68.00/o and after amputation in lower third - 100.00/o.

After amputation in lower third of shoulder apropos of sepsis with the bullet break of the bones of forearm recovered 68.00/o of injured people, after amputation in middle third of forearm and on the unexplained level of amputation recovered 100.00/o.

Based on materials of author's development, after exarticulation

in the hip joint with the septic bullet break of thigh it recovered only 16.0o/o of injured people, after amputation in upper third of thigh - 42.0o/o, in middle third - 33.0o/o and in lower third - 45.0o/o.

After amputation in upper third of thigh with the bullet break of the bones of shin it recovered only 20.0o/o of injured people, and upon the amputation in middle third of thigh - 73.0o/o, in lower third of thigh - 88.0o/o.

According to the data of the development of the histories of disease/sickness/illness/malady, from a number amputated apropos of sepsis with the bullet breaks it recovered: with the breaks of shoulder - 65.0o/o, the bones of forearm - 77.8o/o, thighs - 63.5o/o, the bones of shin - 75.2o/o.

Table 147. Frequency of the amputations, produced in the different regions, in injured people with the bullet break of the bones of extremities, complicated by sepsis, during the different years of war (in the percentages) .

Год войны (1)	Район (2)		
	армейский (3)	фронтовой (4)	тыловой (5)
Первый . (6) . . .	30,0	50,0	47,0
Второй . . . (7) . . .	45,5	68,7	31,6
Третий . . . (8) . . .	37,7	62,2	29,0
Четвертый (9) . . .	50,0	70,0	22,0

Key: (1). Year of war. (2). Region. (3). army. (4). front. (5). back.
(6). The first. (7). The second. (8). The third. (9). The fourth.

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These data and study of clinical course convince of the fact that more frequently got better the injured people with the bullet break of the bones of extremities, complicated by the sepsis, which did not require due to the general state of the injured truncation of the extremity considerably higher than place of bullet break. In extra-heavy injured people with the break of the thigh by which for the rescuing of life it was necessary to produce exarticulation, either with the break of the bones of shin - the high amputation of

thigh, or with the break of the bones of forearm - the high amputation of shoulder, post-operation course was heavy. Heaviest course was noted in injured people if necessary to amputate in the infected tissues. With far visited sepsis the amputation could not save injured people.

Heavy septic state conditioned the poor durability of injured people to any active interventions and sometimes stopped surgeon from the use/application of amputation; therefore it was important to establish/install in those subjected to amputation apropos of sepsis the period of death from the day of amputation, since it would have been possible to come to light/detect/expose the dependence of the fatal result on surgical intervention.

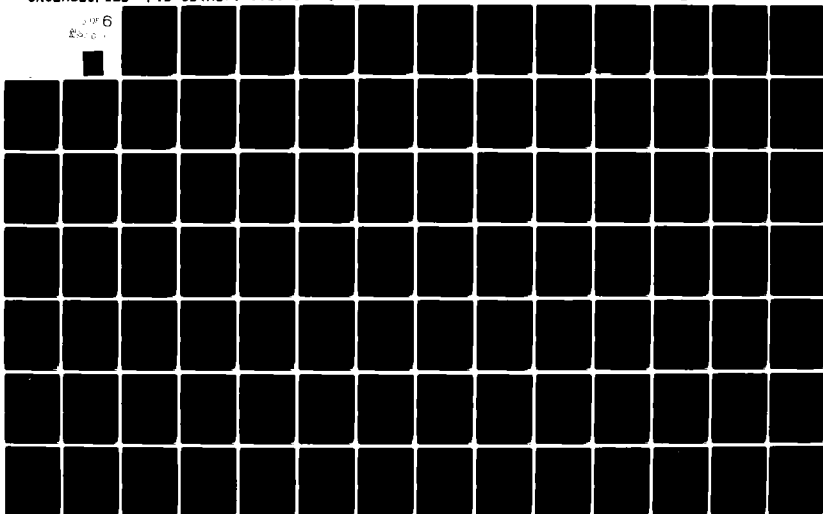
Based on materials of author's development, in 61.70/o of injured people, dead persons after amputation it is later than through the days, lethal outcome could not be placed in connection/communication with the operation/process - death was the consequence of the growing on septic process. Amputation in these injured people proved to be non/without-yl to stop fateful issue, without being, however, the supplementary factor, capable of considerably impairing the state of injured person.

High value in the successful treatment of sepsis had medicinal

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antiseptic substances, symptomatic and over-all strengthening substances: sulfanilamides, solutions of glucose and of sodium chloride, alcohol, blood transfusion, and physical therapy procedures.

According to the communication/report of S. O. Portugalov, as a result of treatment (1944) by penicillin of 40 people with the wound sepsis recovered 36, died 4 (2 from the septicopyemia and 2 - from the reasons, not directly connected with the basic disease). Isolated from the blood of these injured people culture of staphylococcus only in 4 strains of 31, and the culture of streptococcus only into 6 of 26 proved to be resistant to penicillin. Remaining strains yielded to the action of penicillin. Thus, penicillinotherapy proved to be very effective in the group of injured people with the very heavy septic course, which did not be inferior to other substances, including sulfanilamides.

The blood transfusion among the symptomatic substances engaged the visible place in the treatment of sepsis. Septic hemorrhages and phenomena of anemia frequently served as reading to they were repeated to transfusions. Furthermore, the blood transfusion was the excellent stimulant.

On the use/application of blood transfusion in the fight with

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the sepsis with the bullet breaks of the bones of extremities it is possible to judge by Tables 148.

Table 148. Frequency of the blood transfusion in injured people with the bullet break of the bones of extremities, the complicated and not complicated sepsis (in percent).

Группа раненых (1)	Локализация перелома (2)	Плечо	Предплечье	Бедро	Голень
		(3)	(4)	(5)	(6)
С сепсисом (7)	(7)	73,4	73,9	88,5	81,8
Без сепсиса	(8)	27,3	8,1	42,2	25,4

Key: (1). Group of injured people. (2). Localization of break. (3). Shoulder. (4). Forearm. (5). Thigh. (6). Shin. (7). With sepsis. (8). Without sepsis.

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Thus, the overwhelming majority of injured people with the complication of sepsis underwent the blood transfusion, whereas in the absence of sepsis readings to the blood transfusion were placed more rarely.

It is necessary to note that by injured person with the bullet break, complicated by sepsis, the repeated transfusion was conducted more frequently than by injured person, who did not have this complication (table 149).

As can be seen from table 149, with the bullet break of the bones of extremities, complicated by sepsis, the repeated transfusions of blood (on 4 times) to one and the same face were done more frequently (from 2 to 5 times), than in injured people, who did not have this complication, but on the average a number of transfusions to one injured person in the presence of sepsis was 1 1/2-2 times more than in the absence of sepsis.

Ye. L. Berezov for the treatment of sepsis introduced the blood by small doses - 250 ml on the mornings into the periods of apyrexia at intervals during 4-5 days. For an improvement in the state and removal of the state of sepsis it was required not less than 6 transfusions. Of 188 septic injured people, treated employing this procedure, of course, in combination with active interventions, it got well itself by 79.30/o.

On the dosage of the transfused blood with the septic complications of the bullet breaks of the bones of extremities it is possible to judge by tables 150 (based on materials of author's development).

Thus, the majority of transfusions was made doses in 250 ml.

which corresponded to the views of authors' majority on the rationality of the blood transfusions by small doses.

Judging by the direct and further effect, the blood transfusion with the sepsis, of course, in combination with the active surgical measures, exerted in the majority of injured people the favorable effect/action. Reaction to the blood transfusion with the septic complications in the form of chills was the relatively small percentage: with the bullet break of shoulder - 4.8, the bones of forearm - 8.0, thigh - 8.5, the bones of shin - 5.0.

table 149. Distribution of injured people with the bullet break of the bones of extremities, the complicated and not complicated sepsis, according to a number of transfusions of blood (in the percentages).

Локализация перелома (1)	Число переливаний крови		Одно (4)	Два и три (5)	Четыре и больше (6)	Всего (7)	Число переливаний в среднем на одного раненого (8)
	Группа раненых (2)	(3)					
Плечо (9)	С сепсисом	(10)	16,7	36,1	47,2	100,0	3,8
	Без сепсиса	(11)	58,4	31,3	10,3	100,0	1,9
Предплечье (10)	С сепсисом	(10)	29,4	41,1	29,5	100,0	3,6
	Без сепсиса	(11)	68,1	26,4	5,5	100,0	1,5
Бедро (12)	С сепсисом	(10)	23,3	33,9	42,8	100,0	3,7
	Без сепсиса	(11)	42,2	36,6	21,2	100,0	2,4
Голень (13)	С сепсисом	(10)	28,7	35,7	35,6	100,0	3,0
	Без сепсиса	(11)	48,1	36,2	15,7	100,0	2,1

Key: (1). Localization of break. (2). Group of injured people. (3). Number of blood transfusions. (4). One. (5). Two and three. (6). Four are more. (7). In all. (8). Number of transfusions on the average to one injured person. (9). Shoulder. (10). With sepsis. (11). Without sepsis. (12). Thigh. (13). Shin.

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According to the data of author's development, the blood transfusion improved for some time state, especially with the

secondary hemorrhages, even in those injured people, whose sepsis ended unfavorably. By this is disproved the existed preconception about the danger of the blood transfusion with the sepsis and, on the contrary, is determined another position, namely: death could begin in view of the severity of process, in spite of the blood transfusion.

Therefore the positive role of the repeated repeated blood transfusions predominantly at the dose of 250 ml with the sepsis is doubtless.

From the therapeutic factors with the sepsis sizable role played the immobilization. During war were applied different methods of immobilization for the treatment of the breaks, complicated by sepsis. N. N. Askalonov, M. S. Znamenskiy, L. L. Tuminyuk held injured extremity with the break of thigh and bones of shin on Braun's splint with lipcoplastic stretching, in the gypsum bandage with the window above the wound or it is simple in the Diedrichs' splint for the permanent monitoring. In contrast to them A. V. Melnikov, S. G. Rukosuyev were voiced for the anechoic gypsum bandage for the prolonged period.

On the character/nature of therapeutic immobilization gives representation table 151.

From the data of ~~table~~ 151 is revealed/detected the advantageous utilization of an anechoic gypsum bandage in comparison with the remaining forms/species of immobilization during the treatment of the breaks of shoulder and thigh.

Table 150. Distribution of injured people with the bullet break of the bones of extremities, complicated by sepsis, according to a quantity of poured blood (in the percentages).

Локализация перелома (1)	(2) Количество крови (в миллилитрах)			(3) Не выяснено	(4) Всего
	250	251-500	501-1 000		
Плечо . . . (5)	84,0	4,0	—	12,0	100,0
Предплечье . . . (6)	70,0	30,0	—	—	100,0
Бедро . . . (7)	64,8	21,6	2,0	11,6	100,0
Голень (8)	48,0	23,5	—	28,5	100,0

Key: (1). Localization of break. (2). Quantity of blood (in milliliters). (3). not explained. (4). In all. (5). Shoulder. (6). Forearm. (7). Thigh. (8). Shin.

Table 151. Character/nature of therapeutic immobilization in injured people with the bullet break of the bones of extremities, complicated by sepsis (in the percentages).

Локализация перелома (1)	Метод иммобилизации (2)	Окончатая гипсовая повязка (3)	Глухая гипсовая повязка (4)	Шина гипсовая (5)	Вытяжение (6)	Прочие виды иммобилизации (7)	Всего (8)
Плечо . . . (9)		2,5	59,5	31,2	4,3	2,5	100,0
Предплечье . . . (10)		—	31,9	59,0	—	9,1	100,0
Бедро (11)		1,3	59,6	28,0	10,5	0,6	100,0
Голень (12)		3,8	40,5	53,4	—	2,3	100,0

Key: (1). Localization of break. (2). Method of immobilization. (3). Penetrated gypsum bandage. (4). Anechoic gypsum bandage. (5). Splint gypsum. (6). Stretching. (7). Other forms/species of immobilization.

(8). In all. (9). Shoulder. (10). Forearm. (11). Thigh. (12). Shin.

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The treatment of the septic complications of the bullet breaks of the bones of forearm and the shin is passed predominantly to gypsum splint.

Standard and gypsum splints were applied as the independent form/species of primary therapeutic immobilization in injured people with the bullet break of the bones of the extremities in which was observed lightning sepsis and severe intoxication, since in this case it was necessary to resort to repeated surgical interventions.

As a result of the difficulty of monitoring for diagnostics of complications, need for the emptying of flows and use/application of other interventions it was necessary to remove/take gypsum bandages and to replace by their gypsum splints or stretching. On the thigh and the shoulder anechoic gypsum bandage was changed on one time in 75.00/o of injured people, on 2 times and more - in 25.00/o; on the shin the bandage was changed not more frequent than one time.

Stretching played sufficiently modest role in the treatment of injured people with the complication of sepsis, and that only with

the breaks of thigh (10.50/o).

Issues.

The duration of hospital treatment was different in the group of the injured people, who recovered from the sepsis, and in the group of dead persons. Is most relief this it is possible to show based on the example of the group of injured people with the complicated by sepsis bullet break of the thigh: in a number of those recovered it was treated not more than 5 months only 1.90/o and more than 5 months - 98.10/o; death began in the course of the first month in 23.80/o of entire number of dead persons; in the course of the second month - in 46.60/o, later than 2 months - in 29.60/o. On the years of war in the relation to the average duration of treatment both in the survived injured people and in the dead persons of large difference it was not noted.

It is completely obvious that the effect of therapeutic measures on the issues should be examined complexly, i.e., depending on the totality of all measures. Therefore was made attempt analyze on the material of author's development the issues of the bullet breaks of thigh, complicated by sepsis, on such scheme where the results were found in the dependence on the totality of the diverse methods of treatment (table 152). As the criterion of issues are accepted the

recovery with the retention/preservation/maintaining of extremity, amputation and death. For refining the effect of amputations on the course of sepsis was introduced death after amputation.

Table 152. Character/nature of therapeutic measures the had different issues injured people have with the bullet break of thigh, complicated by sepsis (in the percentages).

Группа раненых (1)		Частота (2)		Распределение по виду иммобилизации			(9) Итого
		разрезов гнояников (3)	переливание крови (4)	(5)	(7)	(8)	
				гипсовый повязки	натяже- ние	шины	
Выздоровевшие (10)	С сохранением конечности (11)	33,0	33,0	100,0	—	—	100,0
Умершие (12)	Без сохранения конечности (13)	32,0	48,0	48,0	7,0	45,0	100,0
	Без ампутации . . . (14)	48,0	63,0	60,0	13,0	27,0	100,0
	После ампутации . . . (15)	50,0	81,0	70,0	2,0	28,0	100,0

Key: (1). Group of injured people. (2). Frequency. (3). sections/cuts of ulcers. (4). blood transfusions. (5). Distribution according to form/species of immobilization. (6). gypsum bandage. (7). stretching. (8). splint. (9). In all. (10). Recovered. (11). With retention/preservation/maintaining of extremity. (12). Dead persons. (13). Without retention/preservation/maintaining of extremity. (14). Without amputation. (15). After amputation.

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Thus, the sections/cuts most rarely (33.00/o) were produced in injured people with the presence of the mild case of sepsis, thanks to which it was possible to preserve life and extremity; somewhat

more frequent (46.0-50.0o/o) they were conducted in those injured people who had the heaviest form of sepsis, which involved measure; finally, most frequently (72.0o/o) they were applied in injured people when the sepsis of the average/mean severity is present when was preserved life by the value of the loss of extremity. Less than others the blood transfusion underwent injured people with the relatively favorable clinical course; they recovered with the retention/preservation/maintaining of extremity; more frequent transfusion was applied in the more heavily injured people (48.0o/o), when by injured people it was possible to preserve life, but they lost extremity; finally, most frequently (63.0-81.0o/o) they resorted to the blood transfusion in most seriously wounded, when for survival even amputation was not reliable substance.

As far as immobilization is concerned therapeutic, then the injured people in whom was observed the mild case of sepsis, always it was possible to treat in the gypsum bandage; among the injured people with the presence of the heavier form of the sepsis when, in spite of firm fight, extremity preserved could not be, gypsum bandage could be applied only in 48.0o/o, but in remaining injured people it was necessary to put to use for the fixation splints or stretching; finally, in most heavily injured people, who was killed from the sepsis, most frequently (60.0-70.0o/o) was applied gypsum bandage and are considerably less frequent - splints and stretching. One should

recognize that the application of gypsum dressing by heaviest injured person is inexpedient, since it impedes the observation of the course of wound, so/such necessary in such injured people.

Comparing the dependence of issues on the character/nature of interventions, is not less important to consider their timely and rational use/application.

The results of treatment in the group of injured people with the bullet break of the bones of extremities, complicated by sepsis, based on materials of the development of the histories of disease/sickness/illness/malady, are represented in Table 153.

Table 153. Clinical issues in injured people with the bullet break of the bones of extremities, the complicated and not complicated sepsis (in the percentages).

(1) Локализация перелома	(2) Группа раненых	(3) Клинический исход										(15) умерло
		(4) хороший	(5) контрактура	(6) анкилоз	(7) ложный сустав	(8) культя		(11) остео- миелит	(12) комби- нация исходов	(13) прочие исходы	(14) итого	
						(9) хорошая	(10) плохая					
(16) Плечо	(17) С сепсисом	3,2	10,0	3,3	10,2	50,0	—	6,6	6,8	9,9	100,0	38,7
(19) Предплечье	(18) Без сепсиса	16,2	35,9	3,8	4,2	7,1	1,7	8,1	5,7	17,3	100,0	1,9
	(18) С сепсисом	10,0	5,4	—	5,4	47,4	26,3	—	5,5	—	100,0	17,3
(20) Бедро	(18) Без сепсиса	37,1	27,9	3,4	2,6	3,4	0,8	3,3	3,0	18,5	100,0	0,6
	(18) С сепсисом	—	16,8	6,0	0,8	50,4	17,9	0,3	5,2	2,6	100,0	44,8
(21) Голень	(18) Без сепсиса	12,7	46,1	7,1	0,5	9,0	1,6	7,8	6,5	8,7	100,0	11,4
	(18) С сепсисом	—	5,4	2,8	0,8	71,2	8,1	6,5	2,5	2,7	100,0	29,6
	(18) Без сепсиса	25,9	22,1	2,4	2,0	15,1	1,9	13,3	4,6	12,7	100,0	4,0

Clinical issue. (4). good. (5). contracture. (6). ankylosis. (7). false joint. (8). stump. (9). good. (10). poor. (11). osteomyelitis. (12). combination of issues. (13). other issues. (14). altogether. (15). it died. (16). Shoulder. (17). With sepsis. (18). Without sepsis. (19). Forearm. (20). Thigh. (21). Shin.

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In the clinical issues with the injuries, complicated by sepsis, there was considerably more than amputations and it is more than the false joints (besides shin), than with the injuries, not complicated by sepsis. Good issues it was in no way after complication the sepsis of the bullet breaks of thigh and bones of shin.

Lethality in the group of injured people with the bullet break of the bones of extremities in the presence of sepsis was on the average 10 times higher than in the group of the injured people, who did not have sepsis. On the different segments of extremities these relationships/ratios were different. With the bullet breaks of shoulder, complicated by sepsis, the lethality was 20 times higher, with the breaks of the bones of forearm - 28 times, with the breaks of thigh - 4 times and with the breaks of the bones of shin - 7 times higher than with the breaks, not complicated by sepsis.

The bullet breaks of the bones of extremities were always considered as the very serious damages, especially the breaks of thigh in injured people with the bullet break was noted high lethality.

One should stop at the materials of the first world war, since already then during the treatment was applied asepsis and antisepsis.

In the Russian army, according to N. A. Mal'tsevaya-Vil'kovaya, of 180 injured people with the bullet break of thigh in the hospitals of the nearest rear it died of different reasons 16.7o/o. In the English army, on Bowbly ((Bowbly)), cited according to V. G.

Weinstein]. general/common/total lethality with the bullet breaks of thigh at the end of the war composed 17.50/o. According to K. Frans (Franz), in the German army of 711 injured people with the bullet break of thigh, treated in the field infirmaries, of the sepsis died 18.10/o. These separate and scanty statistical references, of course, cannot serve for a comparative analysis. Nevertheless it should be noted that in the Great Patriotic War, according to the data the developments of the histories of disease/sickness/illness/malady, complication of sepsis with the bullet break of thigh were encountered only in 9.50/o of injured people and significant part of them got well itself, and in the first world war in some stages mortality (in essence from the sepsis) with the bullet break of thigh composed in Russian army 16.70/o, and in the German - 18.10/o; thus, the results of treatment in the first world war were considerably more badly.

For the judgment about the effectiveness of fight with the sepsis during the Great Patriotic War is represented the following curve of the relationships/ratios of three indicators - lethality, number of those amputated and number of heaviest fragmented breaks of thigh (Fig. 29).

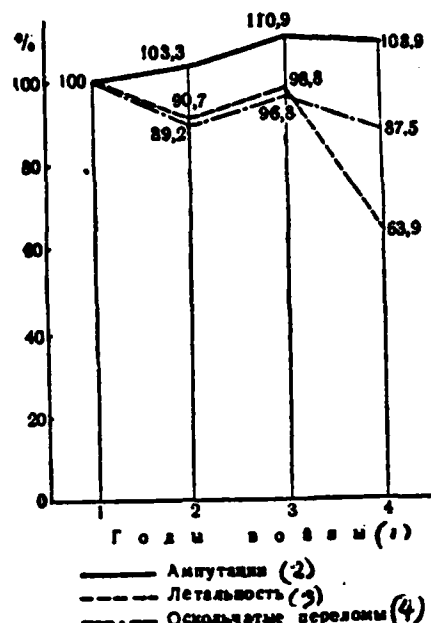


Fig. 29. Amputations and lethality with the bullet breaks of thigh, complicated by sepsis, and also the frequency of fragmented breaks, on the years of war.

Key: (1). Years of war. (2). Amputations. (3). Lethality. (4). Fragmented breaks.

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Thus, from the given curve it is evident that the decrease of lethality from the sepsis during the second and third year of war was accompanied by increase of the number of amputations; in this case was decreased a number of fragmented breaks, i.e., most heavy, with which the amputations were shown more frequently.

On the fourth year of war a considerable reduction in the lethality was not accompanied by an increase in the number of those amputated, i.e., it occurred not due to the amputations; in this case a reduction in the number of fragmented breaks was insignificant in comparison with the third year. It is doubtless, pronounced the favorable effect/action of the specialized aid, which was applied most of all on the fourth year of war and with the heaviest fragmented breaks it proved to be very effective.

The severity of sepsis among other complications of the bullet breaks of the bones of extremities is determined also by the data about the specific gravity/weight of sepsis among other reasons for death in injured people with the bullet break. Thus, sepsis was the reason for death in 17.60/o of dead injured people with the bullet break of shoulder, in 7.00/o of injured people with the break of the bones of forearm, in 29.00/o - with the break of thigh and in 14.10/o - with the break of the bones of shin.

On the value of sepsis as the reasons for death with the bullet breaks of thigh in the stages of evacuation noted during the Great Patriotic War many authors (table 154).

Army region is secreted by the low indicators of the specific gravity/weight of dead persons from the sepsis, which is very characteristic, since sepsis comparatively rarely was encountered in the therapeutic institutions of army region. It was observed predominantly in the army, front and administrative area, in this case in combat on r. Khalkhin-Gol in 1939 and in the war with the White Finns 1939-1940 (M. M. Akhutin), on which the materials were given by the front region, the specific gravity/weight of sepsis as the reasons for death proved to be higher than in the appropriate stage in the Great Patriotic War.

Sepsis with the bullet breaks of the bones of extremities according to the experiment/experience of the Great Patriotic War presents the serious complication of the predominantly heaviest forms/species of breaks. In the course of war were improved prophylaxis, diagnosis and treatment of sepsis, which contributed to the success of fight for the retention/preservation/maintaining of health of injured people.

table 154. The specific gravity/weight of sepsis among death with the bullet breaks of thigh (according to published data in the war with the White Finns and in the Great Patriotic War) (in the percentages to a number of dead persons) .

Автор (1)	Период наблюдений (2)	(3) Район наблюдений	(4) Процент
Бочаров А. А. (5)	1943 г. (6)	Войсковой (7)	11,0
Бялик В. А. (9)	1945 г.	"	1,4
Он же (10)	1945 г.	Армейский (8)	13,4
Бочаров А. А. (11)	1943 г.	"	17,0
Сукватых (12)	1943 г.	"	14,8
Бочаров А. А. (13)	1943 г.	Фронтальной (14a)	44,0
Вайнштейн В. Г. (14)	1939—1940 гг.	"	29,4
Гаджиев Х. Д. (15)	1941—1945 гг. (6)	Фронтальной и армейский	41,9
Каплан А. В. (16)	1941—1943 гг. (6)	Фронтальной (16a)	49,2
Ахутин М. Н. (17)	1939 г.	"	53,3
Он же (18)	1939—1940 гг.	"	55,5
Векслер Г. Я. и Файвишненко Э. Л. (19)	1941—1942 гг. (6)	Глубокий тыл (19)	50,5
(20) По данным разработки историй болезни в среднем . . .			25,9

Key: (1). Author. (2). Period of observations. (3). Region of observations. (4). percentage. (5). A. A. Bocharov. (6). g. (7). Army. (8). Army. (9). V. A. Byalik. (10). The very same. (11). A. A. Bocharov. (12). Knotty. (13). A. A. Bocharov. (14). V. G. Weinstein. (14a). Front. (15). Kh. D. Gadzhiev. (16). A. V. Kaplan. (16a). Front and army front. (17). M. M. Akhutin. (18). G. Ya. Wexler and E. L. Fayvishenko. (19). Deep rear. (20) According to data from a study of the histories of the disease on the average.

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Chapter VI.

BULLET OSTEOMYELITIS. Bullet professor Lieutenant Colonel of medical service Ye. I. Zazharov. Osteomyelitis of shoulder.

Statistical survey/coverage.

Bullet osteomyelitis was frequent complication with the bullet breaks of shoulder.

According to data of the development of the histories of disease/sickness/illness/malady, osteomyelitis as complication with the bullet breaks of shoulder bone in the Great Patriotic War comprised 34.2-39.3o/o with respect to a total number of bullet breaks of this bone.

These numerals are average/mean for all stages of evacuation; therefore with them coincide data of such institutions as MEP and REP. Thus, on the reports one MEP, osteomyelitis of shoulder was encountered into 36.0o/o, according to the data of another, into 40.0o/o and one REP - into 40.2o/o. In the more foremost stages

osteomyelitis was noted more rarely; so, according to P. G. Korneva, osteomyelitis developed into 30.00/o of all injuries of bones, treated in the hospitals of front region.

In the hospitals of the deep rear the injured people with osteomyelitis of shoulder were detected more frequently A. I. Manuylov, according to the reference data of hospitals of one of the military districts, it determined the frequency of this complication with the breaks of shoulder into 44.00/o.

The distribution of injured people with osteomyelitis of shoulder according to level of break is evident from following data of the development of the histories of disease/sickness/illness/malady (in the percentages): upper third - 31.9, middle third - 35.7, lower third - 28.2, several third - 4.2.

The frequency of the onset of osteomyelitis in the dependence on the level of the break of shoulder bone was determined by the indicators, calculated with respect to a total number of breaks of this level (in the percentages): upper third - 40.2, middle third - 41.5, lower third - 32.6, several third - 43.2, on the average - 39.3.

From the given numerals it is evident that most frequently by

osteomyelitic process were complicated such bullet breaks which seized two next arranged/located thirds of diaphysis of shoulder and were accompanied because of this by the extensive disturbance of the integrity of bone (43.20/o). A number of such injured people with osteomyelitis is not relatively great (4.20/o).

Bullet osteomyelitis of shoulder most frequently was developed with the injury upper and middle third, less - with the injury of lower third of this bone.

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Conditions of the onset of bullet osteomyelitis.

During the study of the special features/peculiarities of the pathogenesis of bullet osteomyelitis of shoulder, first of all, necessary to explain:

- a) what dependence existed between the onset of osteomyelitis and those conditions, under which occurred the injury of shoulder;
- b) which of these conditions they especially contributed to the development of this complication.

Conditions, with which occurred the injuries of shoulder bone, were diverse and numerous. However, some of these conditions (form/species of the wounding projectile, character/nature of injury and sizes/dimensions of the decomposition of tissues, form/species of break and degree of the pollution/contamination of wound) depended and were determined only by the diversity of combat circumstances. The periods of rendering to first aid, time and character/nature of immobilization, presence of primary surgical processing, its volume, character/nature and periods, full value of intervention composed the second group of the conditions which were determined by the degree of the organization of surgical aid at the front and therefore they were located completely in the sphere of available medical action. During the explanation of pathogenesis of bullet osteomyelitis it is necessary to examine also a question as to what degree of the measure of therapeutic and preventive character/nature, undertaken in these stages evacuations apropos of the bullet break of shoulder, could influence those pathological changes which began in the extremity with its bullet injury and was created soil for the subsequent onset of osteomyelitis on the spot of break.

Depending on the form/species of the wounding projectile bullet osteomyelitis of shoulder developed with the bullet injuries in 35.80/o of injured people, with the fragmentation ones - in 42.00/o of injured people.

From these data it is evident that the onset of osteomyelitis of shoulder was connected more with the fragmentation injury, than with the bullet, although the breaks of shoulder, caused by bullet, were encountered considerably more frequent (56.7o/o) than by fragment (43.3o/o).

This dependence can be explained only by the larger traumatization of tissues (including bone) and by the larger pollution/contamination of wound with the fragmentation injury in comparison with the bullet; so, among the bullet injuries there were 15.6o/o of crushed breaks, and among the fragmentation ones - 25.9o/o. The distribution of injured people with bullet osteomyelitis of shoulder according to the character/nature of injury proved to be the following (in the percentages): blind-end injuries - into 23.2o/o, perforating injuries - into 76.8o/o.

The frequency of osteomyelitis with the blind-end injuries was equal to 46.1o/o, and with the through ones - 39.2o/o, i.e., with the blind bullet breaks osteomyelitis was observed somewhat more frequent.

What value in the pathogenesis of osteomyelitis of shoulder did

have the form/species of break? These data are calculated with respect to a total number of each this form/species of break (in the percentages): perforated - 39.1, cross - 36.2, longitudinal, by scythe - 29.5, crushed - 39.9 (5.62), large-splintered - 50.1, small-splintered - 64.1 edge/boundary - 20.8.

As can be seen from the given numerals, osteomyelitis of shoulder was encountered in all forms of break; however, the frequency of its onset in the various forms of break proved to be dissimilar. With the edge/boundary, cross, longitudinal and oblique breaks this complication is noted considerably less frequent than with those crushed, fragmented ones and especially small-splintered ones. This difference is explained by the fact that with the fragmented breaks were created the conditions, to the larger degree the contributed to development infections and to the damage/defeat of bone by osteomyelitic process.

With the simple and less compound fractures (edge/boundary, cross, by scythe) the created conditions less contributed to the onset of osteomyelitis on the spot of break.

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It is necessary especially to stop at the crushed breaks, which were heaviest, and meanwhile the complication of osteomyelitis with them was observed more rarely (39.90/o) than with the fragmented. This is explained by the fact that with these breaks during the primary surgical processing frequently was conducted the amputation. If we exclude such injured people, then it will seem that osteomyelitis with the crushed breaks composed 56.20/o, i.e., it was observed more frequently than with the large-splintered ones.

What value in the development of osteomyelitis of shoulder did have the periods of the feed to first aid and the use/application of transport immobilization in the foremost stages of evacuation with the breaks of shoulder?

The study of data, that relate to this question, showed that 87.80/o of injured people to the breaks of shoulder, complicated by osteomyelitis, obtained by first aid for the first six hours and 12.20/o - it is later than 6 hours.

As far as immobilization is concerned transport, then it was applied during the first day in 75.00/o of total number of injured people with bullet osteomyelitis.

During the determination of the frequency of the onset of this complication in the dependence on the periods of rendering of first aid it came to light, that in injured people, which first aid was shown/rendered for the first six hours, osteomyelitis subsequently developed in 38.50/o of injured people, later than six hours - in 33.80/o. Similar data are acquired in the relation to the periods of the use/application of transport immobilization - 40.1 and 41.30/o.

Hence it is apparent that the frequency of the onset of osteomyelitis of shoulder, depending on the periods of the feed to first aid and the use/application of transport immobilization, changed very little.

During discussion of the question about bullet osteomyelitis in literature, dedicated to the explanation of the etiology of this complication, high value was added to the primary surgical processing (its periods, volume and character/nature) as by one of the main preventive measures of fight with the development of osteomyelitis

(V. V. Gorinevskaya, S. R. Mirotvortsev, V. D. Anchelevich, A. A. Ozherel'yev, I. G. Rufanov, A. I. Savitskiy, A. P. Lepukal'n, A. D. Ochkin, V. M. Svyatukhin et al.).

According to the data of the development of the histories of disease/sickness/illness/malady, among injured people, whose primary surgical processing of break was produced, osteomyelitis of shoulder noted into 40.7o/o; among those injured people who primary processing would not undergo, this complication is noted into 33.4o/o.

The period of production in the primary surgical processing for the onset of osteomyelitis of shoulder had the specific value. Thus, among those processed in the first 12 hours after injury osteomyelitis was observed into 38.1o/o, among those processed from 13 to 24 hours - into 41.2o/o, to the second day it is later - into 44.0o/o.

That precisely the period of primary surgical processing had a value, evidently from the fact that a number of fragmented breaks, most which were being frequently complicated by osteomyelitis, among those processed in the first 12 hours was more (49.6o/o), than among those processed in the period from 13 to 24 hours (47.7o/o).

After processing in time from 13 to 24 hours increased a number

of complications of osteomyelitis despite the fact that a number of fragmented breaks, which gave most of all of the complications of osteomyelitis, in this group it was less than in the group of those processed in the first 12 hours. After processing into the second day a number of complications of osteomyelitis even more greatly increased, and a number of fragmented breaks increased only insignificantly.

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Thus, findings make it possible to consider that the opportuneness of primary processing contributed to a reduction in the frequency of the onset of osteomyelitis of shoulder on the spot of its break.

The value of primary surgical processing in prophylaxis of osteomyelitis can be completely explained only under the condition of the detailed study of the problem about that such as there were its volume, character/nature, could this processing of the bullet breaks of shoulder remove the conditions which contributed subsequently to the development of osteomyelitis on the spot of break.

The data, which relate to a question about the frequency of osteomyelitis of shoulder depending on the character/nature of

surgical intervention during the primary processing, are represented in the following form: dissection - 42.90/o, dissection and carving of wound - 42.20/o, dissection and carving with the removal/distance of foreign bodies - 40.20/o, with the removal/distance of bone fragments - 53.20/o, with processing of bone fragments - 44.80/o, processing there were not - 33.40/o ¹.

FOOTNOTE ¹. Percentage is calculated to a number of injured people, who were subjected to processing the corresponding character/nature.
ENDFOOTNOTE.

From the preceding information it is evident that the development of osteomyelitis occurred in all forms of surgical intervention, undertaken during the primary surgical processing of the bullet breaks of shoulder. At the same time with some means of intervention the frequency of osteomyelitis remained at the average/mean level (after the dissection of wound and dissection with the carving), with others - considerably it was raised (after the removal/distance of bone fragments, processing of bone fragments).

An increase in the frequency of osteomyelitis of shoulder depended not so much on the character/nature of surgical intervention, as from form/species and character/nature of bullet break. With the more compound fractures (multi-fragmented) the same

surgical interventions gave the worse results, than with the less complex ones.

Thus, after the operations/processes of the removal/distance of bone fragments and processing of the bone fragments, designed mainly for the elimination of scil for the development of osteomyelitis, this process began considerably more frequently than after the operation/process of dissecting the wound, i.e., this operation/process, which was not being all-inclusive and had by its I aim the prevention of earlier complications. In these all injured people the difference in the obtained results depended on the form/species of break, but not from the character/nature of surgical processing.

Table 155. Frequency of bullet osteomyelitis of shoulder among other clinical issues in connection with the form/species of break and the character/nature of primary surgical processing (in the percentages).

(1) Характер обработки	(2) Вид перелома	(3) Дырчатый и краевой	(4) осколоч- чатый	(5) Раздроб- ленный	(6) Попереч- ный, про- должный, косой
(7) Обработки не было		2,7	9,1	13,4	5,4
(8) Рассечение		2,3	11,7	11,9	9,3
(9) Рассечение и иссечение		2,1	15,4	9,6	4,8
(10) Рассечение, иссечение и уда- ление костных осколков		3,7	11,6	9,3	6,2

Key: (1). Character/nature of processing. (2). Form/species of break. (3). Perforated and edge/boundary. (4). Fragmented. (5). Crushed. (6). Latitudinal, longitudinal, by scythe. (7). Processings it was not. (8). Dissection. (9). Dissection and carving. (10). Dissection, carving and removal/distance of bone fragments.

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To a question as to what degree and in what injured people with the aid of the primary surgical processing it was possible to avoid the development of osteomyelitis of shoulder, answer following data, which show connection/communication between the form/species of the break, character/nature of primary surgical processing and osteomyelitis in the clinical issues of the bullet breaks of shoulder (Table 155).

Thus, in the Great Patriotic War in injured people with the bullet break of shoulder in the clinical issues osteomyelitis was observed dissimilarly frequently: with the perforated and edge/boundary breaks it was observed most rarely after the carving of wound (2.10/o) and most frequently after the removal/distance of bone fragments (3.70/o); with the fragmented breaks - most rarely with the abstention from processing (9.10/o) and most frequently after dissection and carving (15.40/o); with the crushed breaks - most rarely after the removal/distance of the fragments of bone (9.60/o) and most frequently when processing was not performed (13.40/o); with the cross, longitudinal and oblique breaks - most rarely after dissection and carving (4.80/o) and most frequently after the removal/distance of the fragments of bone (6.30/o). On the whole with the simple breaks best anything it was prevented and more easily flowed/occurred/lasted osteomyelitis after simple processing in the form of carving, with the compound fractures - after complex processing.

Is it possible on the basis of the data presented to come to the conclusion/derivation that all measures of surgical prophylaxis, undertaken in the foremost stages of evacuation in the relation to warning/prevention of bullet osteomyelitis, did prove to be

insufficient?

This conclusion/derivation would be incorrect. The opportuneness of rendering to first aid, the use/application of transport immobilization, primary surgical processing, its volume, periods and character/nature, wide utilization of antiseptic substances, etc. composed such complex of surgical action which provided the course of the breaks of shoulder bone without the development of osteomyelitis on the spot of break in 57.40/o of all injured people (after the exception/elimination of early dead and amputated).

Furthermore, the surgical measures of prophylaxis of wound complications in the foremost stages of evacuation in essence were directed to the fight not so much with the late complication in the form of osteomyelitis, as with the early complications which within the nearest periods after injury created a direct threat of the integrity of entire extremity or life of injured person.

Given data indicate that the onset of osteomyelitis on the spot of the bullet break of shoulder was located in the dependence not only on the local conditions, but also on the effect of general/common/total reasons - degree of the virulence of the caught into the wound infection, degree of the resistivity of organism.

Clinical course, symptoms and diagnosis.

The clinical picture of bullet osteomyelitis of shoulder was determined by the presence of the lastingly existed inflammatory process on the spot of the break of shoulder bone it was characterized by prolonged, chronic course. In the overwhelming majority of injured people (93.80/o) could not be trapped the sharp/acute development period of osteomyelitis; its course from the very beginning was chronic; in 11.60/o of injured people it remained the same for the duration entire period of complication and was not accompanied by any aggravation.

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In 82.20/o of injured people the chronic course of osteomyelitis through the different time intervals was disturbed by the periods of aggravations with an increase in the temperature and by strengthening the local and general/common/total symptoms of inflammation. The periods of aggravation after the spontaneous autopsy of ulcer or its emptying during surgical intervention were changed by the periods of the remission/abatement of clinical phenomena in the course of several weeks and months to the onset of new aggravations.

In 6.20/o of injured people with the complicated by

osteomyelitis bullet break (according to the data of the development of the histories of disease/sickness/illness/malady) the development of osteomyelitis was joined with the onset of the sharp/acute clinical phenomena of local and general character/nature, which developed during 1-2 weeks after injury. Since in this case into the inflammatory process were involved all damaged with the injury soft tissues and bone tissue, this clinical course was considered as the sharp/acute form of osteomyelitis, although in such injured people on the passage of sharp/acute period the complication took the common for it long current chronic form. Therefore under the sharp/acute form of osteomyelitis was understood sharp/acute phase in its clinical course (N. I. Krauze). Sharp/acute period was continued different periods - from 1 to 2-3 and more than weeks; in some injured people it was accompanied by the septic phenomena (2.30/o with respect to all injured people with the complication of osteomyelitis and 13.80/o with respect to the injured people with the presence of acute osteomyelitis).

The chronic course of bullet osteomyelitis was in full/total/complete agreement with those pathoanatomical changes which were developed on the spot of the bullet break as a result of osteonecrosis, which began under the effect/action of trauma (S. S. Girgolav and T. Ya. Ar'yev). These changes, on the contemporary views, are the product of the necrobiotic and inflammatory processes

which are developed in the damaged bone and its scrap (I. V. Davydovskiy, A. V. Smol'yannikov, S. M. Derizhanov, P. G. Kornev).

All forms of terminal osteomyelitis with the simpler diaphysic breaks (oblique, cross, etc.) were characterized by flaccid, primary-chronic course.

Osteomyelitis, which arose with the fragmented breaks and which was being accompanied by sequestration and gradual departure/separation of bone fragments, gave the predominantly relapsing/recidivism/recidivist/recidivity form of clinical course.

In all injured people with acute bullet osteomyelitis was noted the simultaneous extensive decomposition of the soft tissues of shoulder. Osteomyelitis was developed in 34.20/o of injured people with the break of shoulder and the simultaneous injury of large vessels, moreover sharp clinical course was noted in 7.20/o, flaccid chronic course - in 27.00/o.

In the group of injured people with multiple failure of nerves osteomyelitis was developed in 47.00/o; in this case sharp clinical course is noted in 8.10/o, flaccid chronic course - in 38.90/o.

Thus, the pattern of the clinical flow of osteomyelitis of

shoulder to a considerable degree was determined by the character/nature of injury, by the degree of the damage of soft tissues and by the form/species of break.

With limply current osteomyelitis of shoulder, according to the data of the author's development of the histories of disease/sickness/illness/malady, increase in temperature and quantity of leukocytes in the overwhelming majority of injured people (86.00/o) it was not noted. Changes from the side of ROE were not observed in 30.00/o. According to the data of L. V. Konnikova, ROE was normal in 60.00/o of injured people.

In these injured people the diagnosis of chronic osteomyelitis was based mainly on the local symptoms and on the data of x-ray examination.

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With bullet osteomyelitis of shoulder the general state of injured people did not suffer. The possibility of the onset of amyloidosis with bullet osteomyelitis was not confirmed. According to the data of author's development, with osteomyelitis of shoulder was not recorded not one complications of amyloidosis.

The permanent pathognomonic symptom of osteomyelitis was presence of one or multiple fistulas with by suppurative the separable and periodic departure/separation of fine/small bone sequestrations. This symptom was frequently the first and only clinical sign, which indicated the onset of this complication.

Fistulas, as a rule, were opened/disclosed into the wound granulating surface or into the scars, which were being formed on the spot of the former wound. The delayed healing of wound and the presence of fistula served as basis for the supplementary production of the X-ray photograph for the purpose of the refinement of diagnosis. As an example can serve the following observation.

G-v, 21 year, 27/IV 1942 obtained the perforating bullet injury of middle third of shoulder with the damage to bone. 12 Hours after injury on DMP is produced the wide dissection of input and outlet. Is superimposed the splint of Cramer. During 5 days an increase in the temperature to 38°. 28/IV is superimposed anechoic gypsum bandage. 6/VI gypsum bandage it is taken/removed in the hospital of the deep rear. Granulating wounds. Fistula with abundant suppurative discharge. 7/VI x-ray: the break of shoulder with the satisfactory standing of scrap and the formation of the callus in zone of which destructive section with the sequestrations in the center. Temperature normal, from time to time is raised to 37.1°.

Blood: Hb 68g/o, eras. 4300000, l. 6400; ROE 12 mm an hour.

Diagnosis: bullet osteomyelitis of shoulder.

21/VI 1942 under the local anesthesia is produced sequestrectomy. Section/cut through the fistula. The trepanation of the callus, is discovered the cavity by the size/dimension 3x4 of cm, from which are removed the sequestrations. Into the wound is filled the streptocide. Is superimposed anechoic gypsum bandage. Post-operation course is smooth. The general state better. 8/VII gypsum is taken/removed. The insignificant granulating surfaces. 24/VIII in the X-ray photograph is revealed the consolidation of break, wound completely cicatrized. Duration of treatment - 4 1/2 months.

During the chronic course of osteomyelitis each aggravation was accompanied by deterioration in the general state of injured person, by an increase in the temperature frequently to 39° it is above, by high leukocytosis and by increase of ROE to 50-60 mm an hour. From the local symptoms was noted the onset or strengthening of pains in the extremity on the spot of injury and sharp sickness with the feeling, swelling, edema and packing/seal of the tissues of extremity in the region of break with the reddening of the skin above the

section of inflammatory infiltration or the sections of softening and fluctuation as a result of the formation of suppurative flows, phlegmons and abscesses; the granulations, which cover wound, were flaccid, edematic, glassy. The aggravation of process accompanied an increase and the sickliness of regional lymph nodes.

Aggravation frequently preceded the occlusion of fistula openings/apertures or the insufficient outflow of pus through the fistula.

After the autopsy of suppurative flows, removal/distance of pus sometimes with the departure/separation of the fragments of bone or after the spontaneous emptying of the ulcer through the fistula the overall and local phenomena of inflammation calmed down and clinical course became newly flaccid, chronic. As an example can serve the following observation.

P-v, 35 years, it is injured 14/I 1944. Perforating bullet injury of middle third of left shoulder with the damage to bone. On DMP 19/I the dissection of wounds the splint of Cramer. The general state is satisfactory.

Temperature 37.5°. 30/I the X-ray analysis: the fragmented break of diaphysis, the standing of scrap is satisfactory. 31/I the anechoic discharge thoracobrachial bandage. During 3 weeks favorable course without an increase in the temperature. 20/II in the following stage appeared severe pains in the hand, the general state deteriorated, temperature to 39.5° during 5 days. Leukocytosis 15000; ROE of 60 mm an hour. Gypsum bandage is taken/removed. On the posterior surface of shoulder on the boundary of middle and upper third sharply morbid infiltrate with the reddened skin. Wound with the flaccid granulations. In the center of wound fistulas with insignificant suppurative discharge. The X-ray analysis: the callus on the spot of break is expressed. Separate sequestrations from the fragments of bone in the zone of the break and in the soft tissues. 16/III operation/process under the local anesthesia. Section/cut through the fistula. Removal/distance of free bone sequestrations. Cavity in the callus is opened and scraped. Streptocide. Tampons with Viwnyovskiy's ointment into the wound. Subsequent period without the complications. During 6 weeks normal temperature. In the beginning of May new aggravation. Temperature to 39°, pain, infiltrate on the posterior surface on the spot of the almost cicatrizing wound. Reddening and softening, formation of fistula. In the X-ray photograph fine/small bone sequestrations in the region of the well formed corn. 15/V operation/process, dissection of skin on the fistula, autopsy of cavity, scraping out and removal/distance of bone sequestrations.

25/VI the full/total/complete cicatrization of wound. In the X-ray photograph is revealed/detected durable callus.

Clinical picture with the sharply current forms of osteomyelitis was determined by extensive implication in the inflammatory process of the soft tissues, damaged with the injury, with the pronounced general/common/total and local signs of inflammation. In 2.30/o of injured people clinical course was accompanied by the expressed septic phenomena with the prolonged feverish state, heavy general/common/total symptoms and considerable changes from the side of the blood. In proportion to the remission/abatement of process the symptoms of sharp/acute inflammation disappeared and clinical course acquired chronic nature.

The diagnosis of bullet osteomyelitis of shoulder did not present difficulties and it was realized on the basis of two basic signs - presence of fistula and data of x-ray examination.

Fistulas with suppurative discharge, periodic departure/separation of the bone sequestrations through the fistula, probing of fistula course, determining in this case the exposed rough surface of bone, presence of defects and by its strain gave the possibility to place correct diagnosis.

However, this diagnosis became being all-inclusive only after the X-ray analysis in two projections, with the aid of which were revealed/detected the various forms and the special features/peculiarities of osteomyelitic process, the presence and a quantity of sequestered bone scrap, the sizes/dimensions of sequestral capsule, the degree of destructive changes in the bones, the bone fragments and so forth, etc.

Bullet osteomyelitis of long tubular bones, including shoulder, in the X-ray image presented the complex and diverse picture, caused by two in parallel by the going and mutually caused processes - to reparation and consolidation of break, on one hand, and by the destructive processes of extinction, rejection/separation and resorption of bone - on the other hand.

Diversity and special features/peculiarities of the X-ray picture of osteomyelitis depended not only on form/species and character/nature of break, but also on remoteness and abundance of process. Than "is older" osteomyelitis, the more complex its X-ray picture.

The roentgenologically determined special features/peculiarities of bullet osteomyelitis are progressive osteonecrosis and osteolysis, sequestration, scaled fimbria periosteum.

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On the author's development of S. G. Yartsev, on 128 injured people bullet osteomyelitis of shoulder osteonecrosis met in 61 injured people, the progressive necrosis - in 51, osteolysis - in 113, including progressive osteolysis - in 58, sequestrations - in 29, different form/species periostitis - in 82 injured people.

Data of the development of the histories of disease/sickness/illness/malady regarding the stage, in which was realized the first x-ray examination in injured people with osteomyelitis of shoulder, attest to the fact that on DMP it was conducted in 0.20/o, in the army region - in 13.70/o, in the front region - in 39.10/o, in the deep rear - in 47.00/o; it was not conducted in 9.20/o.

Thus, the most precise diagnosis of osteomyelitis of shoulder was realized predominantly in the front and deep rear. This is explained by the fact that to the time of the admission of injured people to these stages of evacuation the clinical and X-ray picture of developing osteomyelitis managed to be determined.

The periods of the recognition of this complication can be judged from following data of the author's development of the histories of disease/sickness/illness/malady.

Osteomyelitis was established/installed in the course of one month - in 37.20/o, in the course of 2 months - in 38.50/o, 3 months - in 14.60/o, 4 months - in 7.30/o and during 5 and more than months - in 2.40/o of injured people.

Thus, in the majority of injured people this complication was identified in the course of the first two months after injury, and in one fourth of the injured people - during 3 and more than months. Delay with the diagnosis of osteomyelitis of shoulder is directly connected with the treatment of the bullet breaks of this bone with the aid of the anechoic gypsum discharge thoracobrachial bandage, which was laid for the purpose of the immobilization of break on the prolonged period. The diagnosis of osteomyelitis in many injured people could be placed only after the removal/taking of bandage, especially during the flaccid, chronic course of osteomyelitis.

The study of data, obtained on the experiment/experience of the Great Patriotic War in the relation to the periods of the diagnosis of osteomyelitis of shoulder, shows that the diagnosis of this complication was placed in the stages of evacuation in many injured

people with the retardation, which entailed retardation and surgical intervention.

In a quantity of passed stages the injured people with the bullet break of shoulder, complicated by osteomyelitis, were distributed as follows (according to the data of the development of the histories of disease/sickness/illness/malady): 2 stages - 1.30/o, 3-4 stages - 25.60/o, 5-6 stages - 50.30/o, 7-8 stages - 19.10/o, 9 and more than stages - 3.70/o.

On the average the injured people with bullet osteomyelitis of shoulder passed 5.4 stages, and without this complication - 4.9.

Certain this multistratal nature is explained by the fact that injured people with the break of bones, complicated by osteomyelitis, they guided for the treatment into the deep rear.

Treatment.

The surgical treatment of bullet osteomyelitis of shoulder in the Great Patriotic War was aspect of general problem - the treatment of bullet osteomyelitis of long tubular bones generally.

This question since the beginning of the Great Patriotic War

began to attract attention, especially among the surgeons of back evacuation hospitals, and it repeatedly served as the object/subject of discussion. It was a program question at the 1st and 2nd plenum of the scientific medical council of Narkomzdrav of the USSR.

Among the authors, who worked regarding bullet osteomyelitis, the unity of views on the character/nature of pathoanatomical changes with osteomyelitis and to the classification of its forms was achieved/reached at the end of the Great Patriotic War.

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Authors' opinions relative to surgical treatment and prophylaxis were unanimous. Some disagreements concerned only the character/nature of those operations/processes which were recommended both in the relation to prophylaxis of this complication (removal/distance of the fragments of bone, processing bone fragments, etc.) and during the treatment of already developing osteomyelitis (subperiosteal resection of diaphysis).

The study of data, obtained on the experiment/experience of the Great Patriotic War, concerned, first of all, those surgical interventions of preventive and therapeutic character/nature which were undertaken in the stages of evacuation in the fight with bullet

osteomyelitis with the breaks of shoulder.

From the total number of injured people with the bullet break of shoulder, in which subsequently developed osteomyelitis of shoulder bone, it is in no way operated by 23.40/o, operation/process only on the soft tissues was conducted in 8.00/o, on the bones (sequestrectomy, resection) - in 68.60/o (Table 156).

From year to year was decreased a number of injured people, who were undergoing conservative treatment and operations/processes only on the soft tissues, and was increased a number of injured people, in whom during the operation/process were conducted the manipulations on the bone focus. Especially sharply was shortened within the time of war a number of injured people, in whom was conducted conservative treatment.

All these methods were applied for the treatment of osteomyelitis, which arose with the breaks of different type (Table 157).

Table 156. Methods of the treatment of bullet osteomyelitis of shoulder during the different years of war (in the percentages).

(1) Годы	(2) Метод лечения	(3) Только консер- вативный	(4) Операция только на мягких тканях	(5) Операция на кости	(6) Всего
1941		38,4	11,6	50,0	100,0
1942		32,5	10,9	56,6	100,0
1943		21,6	8,4	70,0	100,0
1944		18,2	5,0	76,8	100,0
1945		15,0	6,2	78,8	100,0
(7) В среднем . . .		23,4	8,0	68,6	100,0

Key: (1). Years. (2). Method of treatment. (3). Only conservative.

(4). Operation/process only on soft tissues. (5). Operation/process on bone. (6). In all. (7). On the average.

Table 157. Methods of the treatment of bullet osteomyelitis of shoulder, which complicated the breaks of carved form/species (in the percentages).

(1) Вид перелома, осложнившегося остеомиелитом	(2) Метод лечения	(3) Только консер- вативный	(4) Операция только на мяг- ких тка- нях	(5) Опера- ция на кости	(6) Всего
(7) Дырчатый и краевой		18,0	14,5	67,5	100,0
(8) Скользящий		21,1	6,4	72,5	100,0
(9) Раздробленный		22,7	8,3	69,0	100,0
(10) Прочие		28,7	14,3	59,0	100,0

Key: (1). Form/species of the break, which was complicated by osteomyelitis. (2). Method of treatment. (3). Only conservative. (4). Operation/process only on soft tissues. (5). Operation/process on bone. (6). In all. (7). Perforated and edge/boundary. (8).

Fragmented. (9). Crushed. (10). Other.

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However, operations/processes on the bones most rarely (59.0o/o) were employed with osteomyelitis, which complicated the full/total/complete unsplintered breaks, and most frequently (72.5o/o) - with osteomyelitis, which complicated fragmented breaks, since separate splintered bones more rapidly were sequestered and more easily were distinguished in the X-ray photograph.

In 20.0o/o of injured people with osteomyelitis of the shoulder of sequestrectomy (or resection) it was the first operation/process, in 58.8o/o it preceded only primary surgical processing, in 6.0o/o - other operations/processes (reworking) and in 15.2o/o - primary and reworking (Table 158).

In the course of the war sequestrectomies increasingly more frequently and more frequently preceded only primary surgical processing or latter in combination with other operations/processes, all less frequent and less frequent - other operations/processes; a number of injured people who sequestrectomy (or resection) had the first operation/process, within the time of war it decreased 3 times and more. The decrease of a number of other operations/processes, and

also number of injured people, in which to sequestrectomy the operations/processes completely were not conducted, should be related not only due to more frequent production in the primary surgical processing, which conditioned primary-chronic course of osteomyelitis, but also due to the use/application of sequestrectomy within the earlier periods (Table 159).

Table 158. Operations/processes, which preceded sequestrectomy (or resection), with bullet osteomyelitis of shoulder during the different years of war (in the percentages).

(1) Годы	(2) Характер операций	(3) Первич- ная хи- рургиче- ская об- работка	(4) Другие операции	(5) Первич- ная хи- рургиче- ская об- работка и другие операции	(6) Операций не произ- водилось	(7) Всего
1941		30,4	14,3	12,5	42,8	100,0
1942		42,7	8,4	15,0	33,9	100,0
1943		56,0	7,3	16,7	20,0	100,0
1944		71,3	4,1	14,0	10,6	100,0
1945		70,0	1,3	15,7	13,0	100,0
(8) В среднем...		58,8	6,0	15,2	20,0	100,0

Key: (1). Years. (2). Character/nature of operations/processes. (3). Primary surgical processing. (4). Other operations/processes. (5). Primary surgical processing and other operations/processes. (6). Operations/processes it was not conducted. (7). In all. (8). On the average.

Table 159. Periods after injury to the production of first sequestrectomy with bullet osteomyelitis of shoulder during the different years of war (in the percentages).

(1) Годы	(2) Срок в месяцах						(3) Всего
	1	2	3	4	5	6 и более	
1941	3,5	7,1	18,0	28,8	12,5	32,1	100,0
1942	3,0	17,8	25,0	25,4	15,8	13,0	100,0
1943	6,0	28,0	33,0	20,3	9,7	5,0	100,0
1944	16,1	32,7	28,4	12,5	7,1	3,2	100,0
1945	17,2	37,6	28,0	10,3	5,1	1,8	100,0
(5) В среднем...	10,0	27,2	28,6	17,8	9,5	6,9	100,0

Key: (1). Years. (2). Period in months. (3). and more. (4). In all.
(5). On the average.

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As can be seen from Table 159, in 1941 a great number of sequestrations was produced after 6 months after injury, and in 1945 - in 2 months. This increase of surgical activity must be considered one of the favorable phenomena, which contributed during war to recovery from osteomyelitis.

How are explained the late periods of surgical interventions with bullet osteomyelitis of shoulder? Delay could depend on the late diagnosis of this complication, about which it was said above. However, if we trace the periods, which passed from the moment/torque of the diagnosis of osteomyelitis to the moment/torque of intervention in regard to this, then it appears that surgical

intervention far not in all injured people followed the diagnosis. Thus, according to the data of author's development, injured people on the periods, which passed from the moment/torque of the diagnosis of osteomyelitis to the operation/process, were distributed as follows: are lower than the month - 46.0o/o, one month - 8.1o/o, 2 months - 21.6o/o, 3 months - 13.5o/o, 4 months and more than 10.8o/o.

Thus, more than in the half injured people it passed more than one month from the time of the establishment of the diagnosis of osteomyelitis to surgical intervention, produced apropos of this complication.

As has already been mentioned, 23.4o/o of injured people with osteomyelitis of shoulder bone they did not undergo operation/process, in them was conducted conservative treatment. S. P. Chodkiewicz for the hospitals of the deep rear indicates the higher numeral of the injured people, treated conservatively, 33.0o/o.

Thus, the analysis of findings shows that the delay with surgical intervention with bullet osteomyelitis of shoulder was result as many difficulties with the diagnosis, as surgeon's expectant conservative tactics in the hospitals of the deep rear, which was being recommended during the treatment of bullet

osteomyelitis (M. N. Akhutina, S. A. Novotel'nov).

As early as 1942 in the decisions of the 1st plenum of hospital council of Narkomzdrav of the USSR was shown the need for early diagnosis and early surgical intervention during the treatment of osteomyelitis.

According to the data of the development of the histories of disease/sickness/illness/malady, the operability in the stages of evacuation comprised: in army region 12.00/o, in the front region - 18.20/o, in the deep rear - 59.90/o. From these data it is evident that a great number of interventions fell to the institutions of the deep rear. Consequently, the further into the rear moved injured person with the break of shoulder, the more frequently appeared the necessity for the operation/process.

One operation/process apropos of bullet osteomyelitis of shoulder transferred 61.30/o of injured people, two - 26.70/o, three - 9.50/o, four - 1.80/o, five - 0.60/o, six and more - 0.10/o of injured people.

Table 160. Distribution of injured people with bullet osteomyelitis of shoulder according to the character/nature of the operations/processes, produced in the different regions (in the percentages) .

(1) Район	(2) Название операции	(3) Вторичная обработка раны	(4) Вскрытие гнойных затеков	(5) Ампутация	(6) Секвестрэктомия	(7) Прочие	(8) Итого
(9) Армейский	52,0	30,9	1,3	8,1	7,7	100,0
(10) Фронтальной	20,2	16,3	1,4	57,0	5,1	100,0
(11) Задней	3,2	2,7	0,3	90,9	2,9	100,0

Key: (1). Region. (2). Name of operation/process. (3). Reworking of wound. (4). Autopsy of suppurative flows. (5). Amputation. (6). Sequestrectomy. (7). Other. (8). Altogether. (9). Army. (10). Front. (11). Back.

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On the average to one injured person with osteomyelitis of shoulder it was necessary for 1.5 operations/processes, and in the absence of osteomyelitis - 1.2 operations/processes.

The character/nature of surgical interventions with osteomyelitis of shoulder, produced in different stages of evacuation, is represented in Table 160.

As can be seen from Table 160, surgical interventions in the army region of larger partly carried the preventive character/nature (revision of wound, removal/distance of bone fragments, processing fragments, etc.). The autopsy of suppurative flows and phlegmons in the institutions of army region composed almost one third of all operations/processes; interventions apropos of developing osteomyelitis - only 8.10/o.

In proportion to the evacuation of injured person by the more distant stages of the front and deep rear the frequency of operations/processes and their character/nature gradually were changed. A quantity of surgical interventions of preventive character/nature was decreased, being inferior the place for the operations/processes, undertaken apropos of osteomyelitis, which, gradually growing/rising numerically, achieved high numerals (90.90/o).

Sequestrectomies and resections composed 89.60/o of all operations/processes, produced apropos of osteomyelitis of shoulder.

The execution technique of sequestrectomies was dissimilar. In some injured operation/process of the removal/distance of bone

sequestrations it was of the scraping out of osteomyelitic focus the sharp/acute spoon through the section/cut on the course of fistula (20.00/o); in others - in the trepanation of sequestral box with the autopsy of cavity in the region of the callus on the spot of break and the subsequent removal/distance of located in it sequestrations (75.00/o); in these injured people the section/cut of skin and soft tissues was conducted, as a rule, also through the granulating wound on the old scar or on the course of fistula; in the part of the injured people the operation/process consisted of the removal/distance of the free bone sequestrations, which lie at the soft tissues in the region of break and which support the liberation/excretion of pus of fistula (5.00/o).

With the examination of a question about the technology and the procedure of the surgical treatment of bullet osteomyelitis of shoulder, first of all, necessary to explain to what degree the results of this treatment they depended on periods and character/nature of undertaken surgical interventions (Table 161).

As can be seen from Table 161, the further was moved aside the period of surgical intervention with osteomyelitis of shoulder, the worse there were the results. Sequestrectomy, undertaken in the course of the first two months after injury, gave the best result with the smallest expenditure of time for treatment.

Table 161. Dependence of the result of the surgical treatment of bullet osteomyelitis of shoulder on the period of conducting sequestrectomy (author's development) (in the percentages).

(1) Срок с момента ранения до секвестрэктомии	(2) Полное руб- цевание раны и консолида- ция перелома	(3) Свищи остались	(4) Итого	(5) Среднее число дней пребывания в гос- питале со времени ранения до пред- ставления на комиссию
(6) Один месяц	79,0	21,0	100,0	132
(7) Два месяца	80,0	40,0	100,0	153
(8) Три месяца и более	50,0	50,0	100,0	201

Key: (1). Period from the moment/torque of injury to sequestrectomy. (2). Full/total/complete cicatrization of wound and consolidation of break. (3). Fistulas remained. (4). Altogether. (5). Average number of days of stay in hospital from time of injury to representation to board. (6). One month. (7). Two months. (8). Three months and more.

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The operations/processes, produced through 3 and more than months after injury, it yielded positive results only in the half injured people, in this case with the greatest expenditure of time, since far visited pathoanatomical changes with the inveterate forms of osteomyelitis created unfavorable conditions for the operation/process and the recovery.

Thus, the success of the surgical treatment of bullet osteomyelitis of shoulder depends first of all on the earlier periods of surgical intervention. According to P. G. Kornev's data, with early interventions - the initial stages of osteomyelitis - the healing began in 80.00/o of injured people.

As to what degree the sequestrectomy technique had an effect on the issue of surgical treatment, testify following data of author's development: the healing of osteomyelitic focus after single curettage began only in 10.60/o, and after the single trepanation of bone cavity and removal/distance of sequestrations - in 74.70/o of injured people.

This shows that the operation/process of the removal/distance of bone sequestrations via the scraping out of osteomyelitic focus by sharp/acute spoon proved to be insufficient, and in the vast majority of injured people were required repeated interventions (83.40/o).

By the resolution of the 2nd plenum of hospital council of Markomzdrav of the USSR sequestrectomy in the form of curettage was acknowledged already during the first years of war by palliative operation/process.

Third-order operations/processes, which consisted of the

removal/distance of the bone sequestrations, arranged/located in the soft tissues, distances good results and did not require repeated operations/processes only in those injured people in whom the free, not closed into the bone cavities sequestrations were the reason for fistula. The removal/distance of these sequestrations involved rapid healing and occlusion of fistula.

The best results were obtained after the trepanation of bone with the wide disclosure/expansion of sequestral box and cavities in the bone and with the careful removal/distance from them of become numb bone fragments, which became "sequestrations".

Given data show that the success of the surgical treatment of bullet osteomyelitis of shoulder depended not only on the early periods of intervention, but also on technology and procedure of operation/process. In some injured people it was necessary to resort to the cross subperiosteal resection of diaphysis (P. G. Kornev). According to the data of the development of the histories of disease/sickness/illness/malady, subperiosteal resection was produced in 1.60/o of injured people.

Thus, the experiment/experience of the Great Patriotic War introduced considerable changes in the treatment of bullet osteomyelitis of shoulder. It showed that conservative expectant

tactics with the use/application of an operation/process within the late periods (in 3-4 months and more) it gave considerably worse results, than the operations/processes, which were being undertaken within the earlier periods (in the course of the first two months).

The use/application of any genus of "seals" in the presence of the treatment of bone cavities with osteomyelitis of shoulder met negative relation and did not enter into the practice.

Introduction to sequestral cavity after the operation/process of tampons and subsequent anechoic gypsum coating (Orr-Ler-Trueta) with the treatment of bullet osteomyelitis of shoulder, according to the data of author's development, was applied only in separate injured people.

For the liquidation of the residual bone cavities, which maintained fistulas, S. S. Girgolav and T. Ya. Ar'yev successfully applied the filling of cavity with the graft/flap of muscle on the pedicle.

According to the data of the development of the histories of disease/sickness/illness/malady, in 56.10/o of injured people the surgical treatment of osteomyelitis was combined with the physical therapy and the medicinal/medicamentous.

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The therapeutic exercise in combination with the medicinal and vitamin treatment was used in 29.20/o of injured people. Thus, complex treatment it was encompassed by 85.30/o of injured people with the bullet break of shoulder, complicated by osteomyelitis.

Prophylaxis.

The measures, directed toward warning/prevention of the development of the complications of the bullet breaks of shoulder, are in detail presented in volume 15. Some of the principal measures are given in Table 162.

As can be seen from Table 162, the best indicators on the preventive measures were noted during the fourth year of war. The same successes were achieved/reached also in the relation to other measures in accordance with the successes, achieved during the treatment of the breaks of other long tubular bones of extremities.

Table 162. Predominant therapeutic measures of preventive character/nature, realized with the bullet breaks of shoulder during the first and fourth year of war (in the percentages).

(1) Год войны	(2) Профилактические мероприятия							(10) применена первая лечебная иммобилизация в первые десять дней
	(3) оказана первая помощь в течение первого часа после ранения	(4) получили первичную хирургическую обработку	(5) произведена первичная хирургическая обработка в течение первых шести часов	(6) Характер обработки				
				(7) расчленение	(8) расчленение и иссечение	(9) расчленение и иссечение с обработкой костной раны		
(11) Первый	61,5	46,9	15,2	35,4	19,1	9,9	57,1	
(12) Четвертый	79,7	86,8	29,6	14,8	13,4	29,0	73,4	

Key: (1). Year of war. (2). Preventive measures. (3). is shown/rendered first aid for first hour after injury. (4). was obtained primary surgical processing. (5). is produced primary surgical processing for first six hours. (6). character/nature of processing. (7). dissection. (8). dissection and carving. (9). dissection and carving with processing of bone wound. (10). is applied first therapeutic immobilization during first ten days. (11). the first. (12). The fourth.

Issues.

The issues of osteomyelitis of shoulder depending on the periods of surgical intervention and procedure of surgical treatment are given above. Surgical intervention on the bone focus was applied in

68.60/o of injured people; 23.40/o of injured people no operation/process they underwent; in 8.00/o of injured people the operation/process was produced only on the soft tissues. However, the numerals of the recovery of osteomyelitis during the use/application of different methods of therapy proved to be sufficiently close to each other. Thus, recovery with the conservative method began in 42.60/o of injured people; somewhat more frequent it was observed during the use/application of palliative operations/processes - in 45.70/o; whereas it is more frequent in all in injured people, who were undergoing operation/process on the bone, 59.40/o; on the average - in 54.30/o of injured people (table 163).

Each of these methods has right to the existence.

A number of those cured with the conservative method from year to year was increased. Since this increase corresponded to the decrease at the same time of a number of injured people, treated conservatively, it is possible to draw the conclusion that the selection of injured people for the conservative treatment with each year was conducted increasingly better and it is better. However, in the relation to the operational methods of the treatment of this strict law it was not noted.

On the whole during war a number of injured people, whose osteomyelitis was cured, increased with 46.4 (1941) to 60.40/o (1945); in the years of war this increase flowed/occurred/lasted unevenly.

The frequency of the recovery of osteomyelitis at the different levels of shoulder was also not identical: in top third - 55.7% , in middle third - 51.80/o, in lower third - 53.60/o; for the elongation/extent several third - 54.30/o. Thus, a small number of cured injured people was observed with osteomyelitis of middle third of shoulder, great - with osteomyelitis upper third. It is possible to assume that the sufficiently frequent use/application of resection with the break, which penetrates into the joint, contributed to the more successful liquidation of osteomyelitis extreme third in comparison with the average.

Is very important a question about the periods of the formation of the callus in injured people with the break of shoulder, complicated by osteomyelitis. In the opinion of some authors osteomyelitis detains the process of consolidation and moves aside the periods of the formation of the callus (V. D. Chaklin); in the opinion of others, this effect is not expressed (A. N. Ryzhikh).

According to the data of the development of the histories of disease/sickness/illness/malady, the periods of the formation of the durable callus of shoulder following (in the percentages): one month - 28.9, 2 months - 38.5, 3 months - 17.2 4 months - 7.6, 5 months - 2.6, 6 months and later - 2.3, unknown 2.9. On the average in injured people with the bullet break of shoulder in the presence of osteomyelitis the callus was formed in 2.7 months, and in the absence of osteomyelitis - in 2 months. Consequently, bullet osteomyelitis detained the formation of the callus on the average by 21 days.

The recovery of bullet osteomyelitis of shoulder yet did not tell about the full/total/complete recovery of injured person, since simultaneously with osteomyelitis frequently were observed other complications, which appeared both at the moment of injury itself (damage of nerves, vessels) and in the period of the subsequent course of break (contracture, false joint, etc.). Therefore should be compared clinical issues in injured people with the bullet break of shoulder, complicated by osteomyelitis, with the issues in injured people, who did not have this complication (Table 164).

As can be seen from Table 164, in the group of injured people with the break of shoulder, complicated by osteomyelitis, into 19.40/o basic issue proved to be osteomyelitis; it means, in these injured people with the extraction osteomyelitis was in the active stage, with the fistulas.

Table 163. Frequency of the recovery of bullet osteomyelitis of shoulder in connection with the method of treatment during the different years of war (in the percentages).

(2) Методы лечения	(1) Годы					(3) В среднем
	1941	1942	1943	1944	1945	
(4) Консервативный	25,6	30,0	50,4	52,8	63,4	42,6
(5) Операция только на мягких тканях	54,6	34,0	58,2	43,5	47,0	45,7
(6) Операция на кости	60,7	50,8	59,7	64,2	60,4	59,4
В среднем	46,4	42,0	57,4	61,1	60,4	54,3

Key: (1). Years. (2). Methods of treatment. (3). On the average. (4). Conservative. (5). Operation/process only on soft tissues. (6). Operation/process on bone.

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If one takes into account, that, according to the data of Table 163, osteomyelitis up to the moment/torque of extraction was cured in 54.30/o of injured people, and 45.70/o of injured people are discharged with the presence of osteomyelitis, then, therefore, in 26.30/o of injured people with the extraction from the hospital osteomyelitis was located in the stage of liquidation, without the fistulas.

According to the data of Table 164, clinical issues in both

groups present considerable differences. Amputation and death as the issues of treatment were observed predominantly in the group of the injured people, who did not have osteomyelitis. This is explained by the fact that in the latter/last group turned out to be 5 times more than the complications of sepsis and 2 times - by anaerobic infection, than in the group of injured people with osteomyelitis. Since located in the stage of remission/abatement osteomyelitis almost always was included in the "combination of poor issues", then "combinations" among the injured people, who suffered osteomyelitis, it proved to be 6 times more than in injured people, who did not have it. Together with osteomyelitis into the "combination" entered the contractures; therefore contractures in the injured people with the bullet break, which were complicated by osteomyelitis, had somewhat less than the injured people, who did not have this complication. A number of ankylosis and false joints in the group of injured people with osteomyelitis of shoulder into 2 and the more of times exceeded a number of such issues in injured people, who did not suffer osteomyelitis.

The complication of osteomyelitis of the bullet breaks of shoulder contributed to the elongation of the period of hospital treatment for 1 1/2 months in comparison with those injured people whose complications osteomyelitis was not (5.4 and 3.9 months). The average period of the stay in the hospital of injured people with

bullet osteomyelitis of shoulder from year to year was decreased:
1941 - 6 months, 1942 - 5.6 months, 1943 - 5.5 months, 1944 - 5.3
months, 1945 - 5.2 months. The contraction/abbreviation of the period
of treatment must be considered the positive factor, which testifies
about an improvement in the quality of treatment. Clinical issues in
injured people with bullet osteomyelitis of shoulder were analogous
to issues in injured people with osteomyelitis of thigh and bones of
shin.

Table 164. Distribution of injured people with bullet break of shoulder, complicated and not complicated osteomyelitis, according to the clinical issues (in the percentages).

(1) Клинический исход	(2) Группа раненых	
	(3) с остеомиелитом	(4) без остеомиелита
(5) Хороший функциональный и анатомический	7,8	21,9
(6) Контрактура	33,2	37,1
(7) Анкилоз	6,0	2,3
(8) Ложный сустав	6,3	3,0
(9) Культи	0,9	14,5
(10) Остеомиелит	19,4	—
(11) Комбинация ¹	11,7	1,9
(12) Прочие	14,7	19,3
(13) Итого	100,0	100,0
(14) Умерло	0,2	3,6

Key: (1). Clinical issue. (2). Group of injured people. (3). With osteomyelitis. (4). Without osteomyelitis. (5). Good functional and anatomical. (6). Contracture. (7). Ankylosis. (8). False joint. (9). Stump. (10). Osteomyelitis. (11). Combination¹.

FOOTNOTE¹. Table 164 depicts the principal issues; in the group "combination" are referred those injured people in who it was difficult to secrete the principal issue. ENDFOOTNOTE.

(12). Other. (13). Altogether. (14). It died.

BULLET OSTEOMYELITIS OF THE BONES OF FOREARM.

Candidate of medical sciences M. M. Bronstein.

Statistical survey/coverage.

Among the complications of the bullet breaks of the bones of forearm, according to the data of the development of the histories of disease/sickness/illness/malady, osteomyelitis occupied the third place after contractures and consequences of the damages of nerves.

Bullet osteomyelitis of the bones of forearm after the first world war composed the significant part of osteomyelitis of all bones of skeleton and oscillated from 5.0 (Ya. M. Bruskin) to 19.80/o (Ya. B. Ryvlin).

According to the data of a number of the authors, bullet osteomyelitis of the bones of forearm after the first world war was encountered into 8.0-50.00/o of all breaks of the bones of forearm.

Data of Table 165 testify about the growing on frequency of the development/detection of bullet osteomyelitis of the bones of forearm

from the front ones to the back therapeutic institutions.

Literature data will agree with the materials of the development of the histories of disease/sickness/illness/malady.

The complications of bullet osteomyelitis were from 12.4 to 25.20/o of all breaks of the bones of forearm.

As far as distribution is concerned of the injuries, complicated osteomyelitis of the bones of forearm, according to the separate bones of the latter, then on anconal came 40.40/o, to the radial - 36.50/o, to both bones - 23.10/o.

The frequency of the complications of osteomyelitis of the breaks of the separate bones of forearm comprised: to all breaks of radial bone - 23.8%, the ulna - 28.00/o and both bones - 35.20/o.

Thus despite the fact that breaks of both bones of forearm were complicated by osteomyelitis more frequently than separate bones, in their fraction/portion of all complications of osteomyelitis it was necessary less (23.10/o) than to the breaks of separate bones (36.50/o and 40.40/o). This is explained by the fact that among all breaks of the bones of forearm most rarely were noted the breaks of simultaneously both bones (vol. 15, pg. 276).

Table 165. Frequency of bullet osteomyelitis of the bones of forearm after the first world war (in the percentages).

(1) Автор	(2) Период	(3) Лечебное учреждение или этап эвакуации	(4) Частота остеомиелита
(5) М. Н. Ахутин	(6) Боевые столкновения на реке Халхин-Гол (1937)	(7) Неизвестно	20,0
(8) И. А. Солдатченко	(9) Война с белофиннами (1939—1940)	(7) Неизвестно	8,0
(10) В. И. Бобрин	(11) То же	(12) Тыловые госпитали	(16) До 12,0
(13) Г. Я. Эпштейн	(11) " "	(15) Фронтальной госпиталь	13,5
(14) М. М. Бронштейн	(18) " "	(12) " "	30,8
(17) А. Т. Лидский	(18) Великая Отечественная война	(12) Тыловые госпитали	18,0
(19) М. М. Бронштейн	(11) То же	(20) Фронтальные и тыловые госпитали	19,4
(21) И. М. Надлер	" "	(21) Тыловые госпитали	20,0
(22) В. Д. Анчелевич	" "	" "	50,0

Key: (1). Author. (2). Period. (3). Therapeutic institution or stage of evacuation. (4). Frequency of osteomyelitis. (5). M. N. Akhutiv. (6). Military engagements on Khalkhin-Gol river. (7). It is unknown. (8). I. A. Soldatchanko. (9). War with White Finns. (10). B. I. Bobrik. (11). The same. (12). Back hospitals. (13). G. Ya. Epstein. (14). M. M. Bronstein. (15). Front hospital. (16). To. (17). A. T. Lidskyy. (18). Great Patriotic war. (19). M. M. Bronstein. (20). Front and rear hospitals. (21). I. M. Nadler. (22). V. D. Anchelevich.

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The larger specific gravity/weight of osteomyelitis of ulna

(40.4o/o) with respect to the radial (36.5o/o) will be in complete agreement with the more frequent complication of osteomyelitis of the ulna.

Some conditions of the onset of bullet osteomyelitis of the bones of forearm.

In etiology and pathogenesis of bullet osteomyelitis primary meaning had the character/nature of break and the degree of the damage of soft tissues. These two factors were located in the close connection between themselves, the degree of the damage of soft tissues usually depending on the character/nature of break.

According to the data of the development of the histories of disease/sickness/illness/malady, the frequency of osteomyelitis with the separate forms/species of break was the following: with the edge/boundary - 13.1o/o, longitudinal - 14.0 o/o oblique - 20.1o/o, perforated - 21.9o/o, large-splintered - 34.0o/o, finely splintered - 38.1o/o, crushed - 39.7o/o.

The character/nature of the damage of soft tissues with the bullet breaks of the bones of forearm plays sizable role in the onset of bullet osteomyelitis. Using the material of author's development, with the point injuries of soft tissues the bullet breaks of the

bones of the forearms, which do not require the primary surgical treatment of wounds, flowed/occurred/lasted usually over the type of the closed break and extremely rarely (4.0o/o) they were complicated by bullet osteomyelitis. The bullet breaks of the bones of forearm with the extensive damage of soft tissues were considerably more frequently complicated by bullet osteomyelitis (29.0o/o).

The breaks of the bones of the forearms, which were being accompanied by the damage of vessels, were complicated by osteomyelitis into 31.5o/o, and with the damage of nerves into 33.9o/o. The damage of vessels contributed to the more frequent complication of osteomyelitis in view of the ischemia, and during the damage of nerves it was disturbed and whereas a trophic system, a number of the fragmented and crushed breaks in the groups of injured people with the damage of nerves and without their damage it was almost identical.

In close connection with the character/nature of break and the degree of the decomposition of bone was located the displacement of scrap. In injured people with osteomyelitis the bias of scrap was absent rarely. Deserves attention of information, given due to this question by D. G. Rokhlin and V. P. Zadvornovoy. Among the injured people, in whom was discovered bullet osteomyelitis, the biases of scrap of radial bone was not detected only in 10.8o/o, the

satisfactory standing of scrap was noted in 18.60/o, the moderate bias - in 34.30/o, considerable bias - in 36.30/o; scrap of the ulna were not displaced in 13.40/o of injured people, the satisfactory standing of scrap was observed in 14.60/o, the moderate bias of scrap - in 35.50/o, the considerable bias of scrap - in 36.50/o of injured people.

Frequency of the complications of osteomyelitis of the breaks of the bones of forearm in the dependence on form/species and character/nature of injury.

In the onset of osteomyelitis of the bones of forearm the form/species and the character/nature of injury had much smaller value, than the character/nature of break. Of this it is easy to be convinced, if to compare the frequency of osteomyelitis with different form/species and character/nature of injury with the number of fragmented and crusted breaks, noted with them (vol. 15).

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The frequency of bullet osteomyelitis of the bones of forearm depending on form/species and character/nature of injury comprised (according to the data of the development of the histories of disease/sickness/illness/malady): with the bullet ones - 19.90/o,

fragmentation - 36.40/o of tangents - 40.30/o, blind - 31.70/o, through - 24.60/o, with crushed - 5.20/o.

It means bullet osteomyelitis it most frequently appeared afterward tangential, blind-end and fragmentation injuries. Most rarely it was observed after crushings, since in this group frequently were conducted amputations (92.20/o).

The dependence between the level of the break of the separate bones of forearm and the corresponding damage/defeat of these bones by osteomyelitis is represented in Table 166 (according to the data of the development of the histories of disease/sickness/illness/malady).

As can be seen from table 166, most frequently bullet osteomyelitis was encountered with the break of the most massive part of the bone - lower third of radial and upper third of cubital. With break of both bones the frequency of osteomyelitis in upper and lower third was almost identical.

It is necessary to nevertheless note that the difference in the frequency of damage/defeat by osteomyelitis of upper and lower third of the radial bone is more considerable than cubital one, that it is possible to place in connection/communication with the following

anatomical special features/peculiarities of the meta epiphysial part of lower third of radial bone:

a) porosity and riches by the vessels of the porous part of the meta-apiphysis;

b) poverty/scarcity by soft tissues in comparison with the overlying divisions of bone;

c) frequently encountered with the breaks of this part of the radial bone cracks towards radiocarpal joint, which facilitate the development not only of osteomyelitis, but also osteoarthritis.

In etiology and pathogenesis of bullet osteomyelitis of the bones of the forearm, besides the severity of injury itself, had a value the character/nature of the therapeutic measures, which were being undertaken in the process of the treatment of the bullet break of the bones of forearm in different stages of evacuation.

The in proper time and correctly produced primary surgical processing was one of the important preventive substances for warning/preventing the complications of osteomyelitis. However, in accordance with the fact that primary surgical processing most frequently had the place with the compound bullet fractures which

were more frequently complicated by osteomyelitis, bullet osteomyelitis of the bones of forearm, naturally, in the group of the injured people, who were undergoing primary surgical processing, was observed more frequently (30.10/o) than in the group of the injured people, in whom it was not conducted (18.80/o).

Table 166. Frequency of bullet osteomyelitis of the bones of forearm depending on the level of break (in the percentages).

(1) Локализация перелома	(1) Уровень перелома	(3) Верхняя треть	(4) Средняя треть	(5) Нижняя треть	(6) В среднем
(7) Лучевая кость		16,0	20,5	26,7	23,8
(8) Локтевая кость		29,1	28,3	23,4	28,0
(9) Обе кости		32,6	38,2	33,4	35,2

Key: (1). Level of break. (2). Localization of break. (3). Upper third. (4). Middle third. (5). Lower third. (6). On the average. (7). Radial bone. (8). Ulna. (9). Both bones.

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The frequency of the onset of osteomyelitis was connected with the time, which elapsed from the moment/torque of injury to production in the primary surgical processing. Thus, osteomyelitis was observed in those processed in the first 6 hours after injury into 28.7o/o and in those processed in the period from 7 to 12 hours into 32.8o/o.

The character/nature of processing was found in direct dependence on the special features/peculiarities of injury and form/species of break; more compound fractures were accompanied by

complex processing more frequently than simple; therefore osteomyelitis was encountered more frequently in the injured people, in whom was performed complex processing, as is evident from the following. After primary processing, into which, besides the dissection and the carving, entered the removal/distance of bone fragments, osteomyelitis was observed in 44.7c/o of injured people: when occurred the dressings of large vessels, in 37.9o/o, processing the fragments of bone - in 37.0o/o; only with the carving of wound - in 27.8o/o; if besides the dissection and the carving were driven out foreign bodies, in 31.1o/o and finally during one dissection alone - for 26.6o/o of injured people. During the Great Patriotic War high value was added also to the secondary surgical processing of bullet wounds, in particular, late revision, to removal/distance of bone fragments, to processing fragments and to autopsy of suppurative flows.

According to the data of the development of the histories of disease/sickness/illness/malady, of this type processing (together with the later primary) had the place into 18.0o/o of all bullet breaks of the bones of forearm, which were complicated by osteomyelitis.

It is known that the secondary and late primary surgical processing was performed in essence in the presence of the

sufficiently expressed inflammatory phenomena in the wound. In such all injured people it was possible to await the complication of osteomyelitis, but because of reworking it was noted only in 41.00/o. When the expressed inflammatory phenomena in the wound it was not detected and reworking was not performed, the complication of osteomyelitis was observed in 23.20/o of injured people.

Therapeutic immobilization with the bullet breaks of the bones of forearm, which were complicated subsequently by osteomyelitis, was more full-valued than with the breaks, which were not complicated by osteomyelitis, and most frequently it was realized in the form of anechoic gypsum bandage (65.40/o) during the periods up to 10 days from the moment/torque of injury in contrast to the group of the injured people, who did not have osteomyelitis where was applied predominantly splint (49.10/o), as is evident from Table 167 (data of the development of the histories of disease/sickness/illness/malady).

Then it is possible to say, also, in the relation to of first aid and transport immobilization.

Table 167. Therapeutic immobilization in injured people with bullet break of the bones of forearm, complicated and not complicated osteomyelitis (in the percentages).

(2) Группа раненых	(1) Вид лечебной иммобилизации	(3) Гипсовая или иная шина	(4) Глухая гипсовая повязка	(5) Прочие	(6) Всего
(7) С остеомиелитом	34,1	65,4	0,5	100,0
(8) Без остеомиелита	49,1	48,9	2,0	100,0

Key: (1). Form/species of therapeutic immobilization. (2). Group of injured people. (3). Gypsum or other splint. (4). Anechoic gypsum bandage. (5). Other. (6). In all. (7). With osteomyelitis. (8). Without osteomyelitis.

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Thus, first aid, transport immobilization, primary and secondary surgical processing, and also therapeutic immobilization in warning/prevention of the complications of osteomyelitis with the bullet breaks of the bones of forearm played secondary role, being inferior the first place for the severity of injury against the background of which became apparent the pathogenetic value of the enumerated factors.

Clinic and diagnosis.

The clinical picture of bullet osteomyelitis of the bones of the forearm is similar to the picture of osteomyelitis of the tubular bones of another localization.

Is distinguished osteomyelitis, which takes place sharply and primary-chronically. So-called subacute osteomyelitis is transition from the sharp/acute form to the chronic. If it exists, then it is revealed/detected badly/poorly, and as any transition from one state to another, it is not characterized by the accurately outlined clinical picture (in the relation to the bones of forearm).

Acute osteomyelitis of the bones of forearm frequently flowed/occurred/lasted over the type of the relapsing/recidivism/recidivist/recidivity phlegmon against the background of the bullet, most frequently fragmented break of the bones of forearm. The clinical signs of acute osteomyelitis are not characteristic, in consequence of which the diagnosis of this severe complication of the bullet break of the bones of forearm is difficult. Abundant festering in the wound not always can be connected with incipient acute osteomyelitis of the bones of forearm, especially as roentgenological data within the early periods either are scanty or they are absent. Against the background of the usual

course of bullet break deteriorated the general state of injured person, was raised general/common/total and local temperature. Appeared the swelling of forearm, frequently anechoic gypsum bandage became intimate. Fingers swelled. The pains in the forearm, which carried the dull, aching character/nature or newly arisen, acquired the sharp/acute fluctuating nature. Wounds became dry, granulations - pale, flaccid; separated of the wounds it usually became less. Hyperemia of the skin integuments of forearm, and after it and actual fluctuation in different sections of the forearm appeared lastly. fluctuation can be absent, since the suppurative impregnation and the melting of tissues, which goes from the bones of the forearm through the muscles and the aponeurotic partitions/septa, late reaches subcutaneous cellular tissue and skin of forearm in view of the anatomical special features/peculiarities of the latter. The function of forearm and hand was disturbed. Motions became especially morbid.

X-ray diagnostics during this period also helped little - roentgenological data were still lean and they consisted in the phenomena of osteolysis. The fringing of periosteum, is so/such characteristic (according to D. G. Rokhlin) for the sharp/acute phase of osteomyelitic process, hardly it was planned.

Acute osteomyelitis frequently was estimated as a deep phlegmon of forearm.

Usually were conducted one or several sections/cuts. In to pus frequently were detected the free bone sequestrations of different value and form. Very soon all phenomena of sharp/acute suppurative inflammation decreased, but completely process was not eliminated, converting/transferring, as a rule, into chronic. Among the early complications of the bullet breaks of the bones of forearm acute osteomyelitis in the different stages of evacuation occupied different place, growing/rising from the army therapeutic institutions to the front ones and further (table 168).

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In view of the temporary stay of injured people in the therapeutic institutions of army and front region the specific gravity/weight of acute osteomyelitis among other complications was above in the administrative area (A. V. Smol'yannikov, vol. 15, pg. 209). In the front and back hospitals for surgeons were most frequently necessary to treat the chronic form of bullet osteomyelitis, which comprised, according to the data of the development of the histories of disease/sickness/illness/malady, 1/3 all late complications of the bullet breaks of the bones of forearm; this form was encountered among the late complications of the bullet

breaks of radial bone in 30.50/o of injured people, cubital - in 35.70/o of both bones of forearm - in 40.60/o of injured people.

The relationship/ratio of the frequency of acute and chronic osteomyelitis (flowed/occurred/lasted without the sharp/acute stage) is evident from table 169.

The signs of chronic bullet osteomyelitis of the bones of forearm did not differ from the signs of osteomyelitis of another localization. Fistulas with chronic bullet osteomyelitis of the bones of forearm were arranged/located in the scars, soldered with the bone for the large elongation/extent, and had different localization. Most frequently they were localized on the cubital and radial side of forearm. This, obviously, it depended on a small quantity of muscles on these surfaces. Considerable muscular-aponeurotic arrays in upper third determined more rare localization of fistulas on the back and volar side of this part of the forearm.

The diagnosis of bullet osteomyelitis of the bones of forearm is substantiated by the clinical picture of process; together with this, irrefutable diagnostic sign of bullet osteomyelitis of the bones of forearm are roentgenological data.

Table 168. The specific gravity/weight of acute osteomyelitis with the bullet breaks of the bones of forearm among another early complications in the therapeutic institutions of the different regions of evacuation (in the percentages).

(1) Район эвакуации (2) Локализация перелома	(3) Армей- ский	(4) Фронт- вой	(5) Тыловой
(6) Лучевая кость	0,7	8,9	10,4
(7) Локтевая кость	0,7	12,1	16,4
(8) Обе кости предплечья	0,4	7,4	16,9

Key: (1). Region of evacuation. (2). Localization of break. (3). Army. (4). Front. (5). Back. (6). Radial bone. (7). Ulna. (8). Both bones of forearm.

Table 169. Frequency of the complications of acute and chronic osteomyelitis of the bullet breaks of the bones of forearm (in the percentages).

(2) Форма остео- миелита	(1) Локализация перелома			(3) Лучевая кость	(4) Локтевая кость	(5) Обе кости одновре- менно
(6) Острая				3,3	5,0	5,2
(7) Хроническая				20,5	23,0	30,0
(8) Всего				23,8	28,0	35,2

Key: (1). Localization of break. (2). Form of osteomyelitis. (3). Radial bone. (4). Ulna. (5). Both bones simultaneously. (6). Sharp/acute. (7). Chronic. (8). In all.

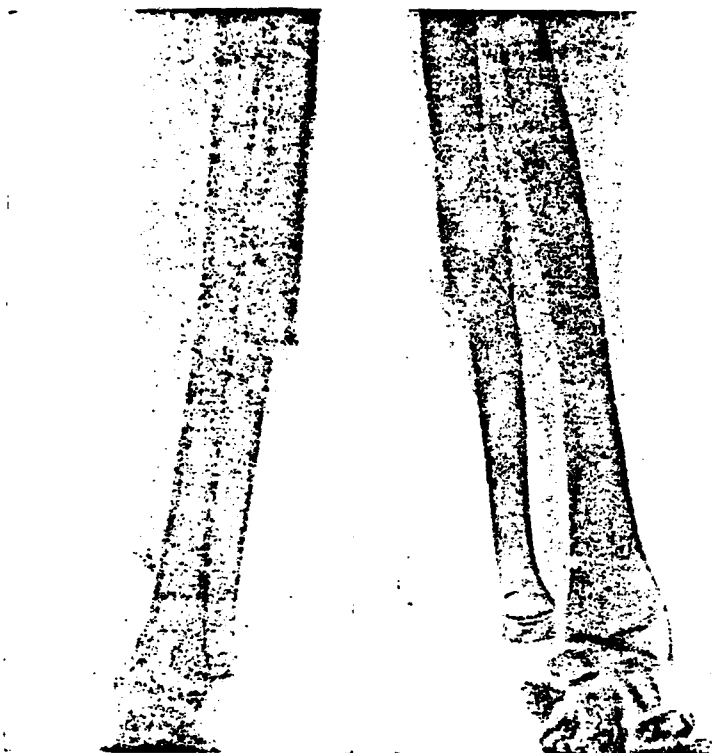


Fig. 30. F., 20 years. Perforating bullet injury of left forearm with slantwise-cross break of the ulna. Photograph is made after injury. Osteolysis and necrotization of the ends of the scap, especially proximal. Torn fringed periosteum on the internal surface. Picture of osteomyelitis.

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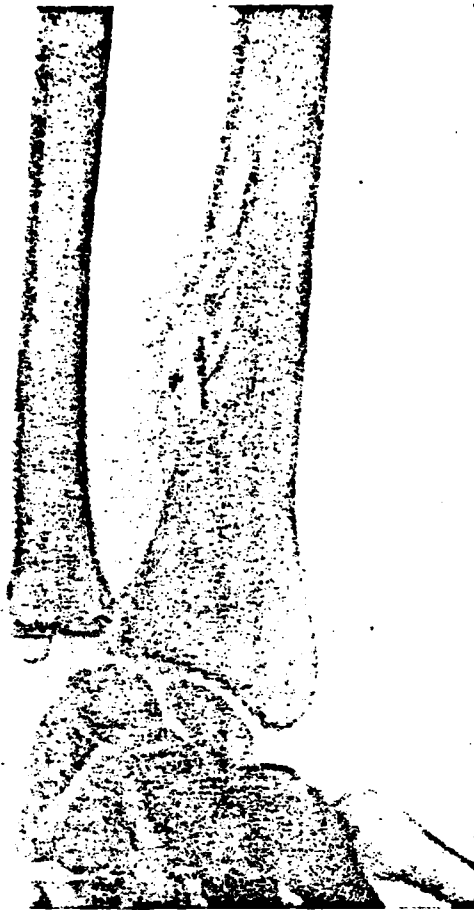


Fig. 31. K., 32 years. Osteomyelitis of left radial bone with one cavity with the sequestrations.

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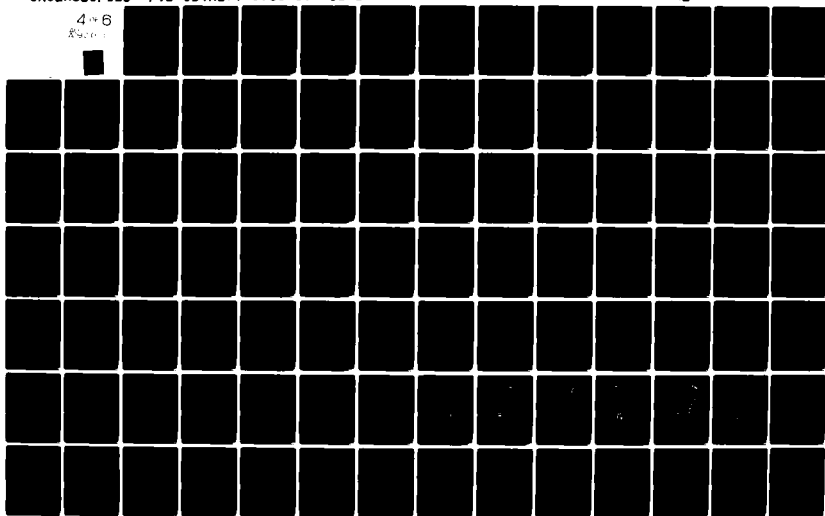
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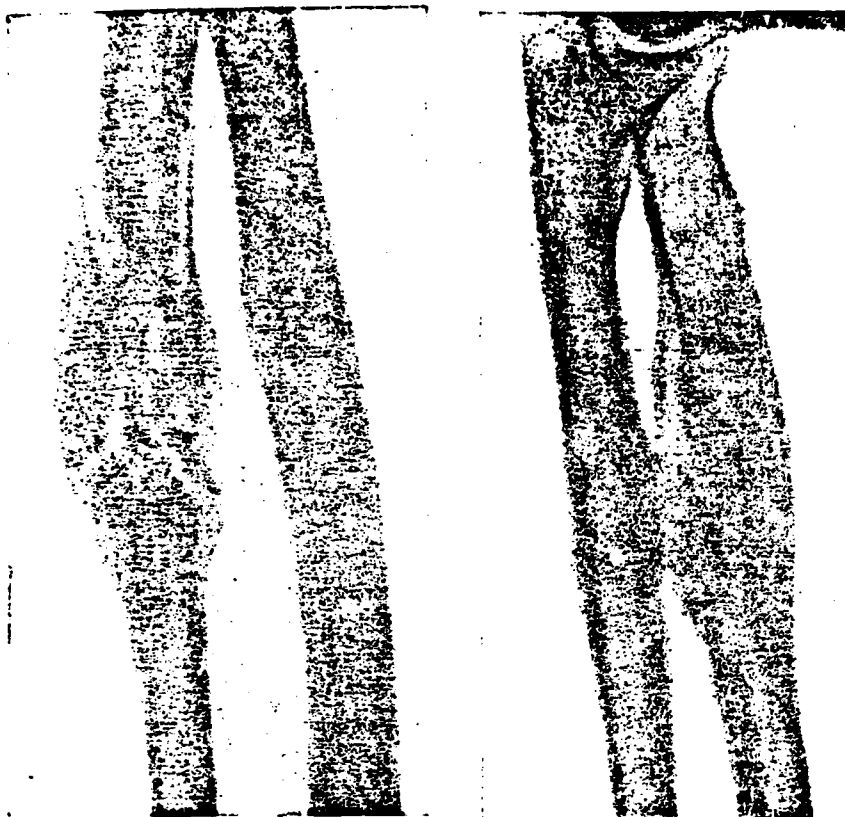


Fig. 32.

Fig. 33.

Fig. 32. B., 20 years. Hollow callus of right ulna.

Fig. 33. Ya., 25 years. General/common/total callus of both bones of forearm with the sequestrations.

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According to the data of D. G. Rokhlin and V. P. Zadvornova,

"the roentgenologically determined symptoms of bullet osteomyelitis in the diaphysis of the bones of forearm were almost the same as and in other long tubular bones. However, the presence of two bones in the forearm, and besides almost identical by power, differs this division from other segments of upper and lower extremity. In contrast to the bullet breaks of the bones of shin with breaks of both bones of forearm with the larger frequency was observed osteomyelitis, which flowed/occurred/lasted more or less equally in both bones.

In the sharp/acute and subacute phase roentgenologically were detected progressive osteonecrosis, osteolysis about the scaling of periosteum. During the stabilization of process there was ceased the increase of osteonecrosis and osteolysis, periosteal layerings were assimilated. With the aggravations was observed most frequently the new scaling of periosteum or fringed periosteum, less frequent - build-up/growth of destruction. The prolonged absence of periosteal reaction in the zone of osteonecrosis and osteolysis attested to the fact that the stabilization did not set in (Fig. 30).

During the osteomyelitic processes, which had considerable range, at the different levels frequently were observed the various forms of periosteal reaction, and at some levels the absence of periosteal reaction. The latter testified about the activity of

process at this level".

Most frequently chronic bullet osteomyelitis of the bones of forearm was roentgenologically determined by one cavity with the sequestrations (Fig. 31), less frequent than there were several in the form of the hollow callus (Fig. 32). In the small part of the injured people was observed general/common/total pathological corn of both bones of forearm with the presence in the latter of osteomyelitic cavities with the sequestrations (Fig. 33).

For a precise X-ray diagnostics of bullet osteomyelitis of the bones of forearm was necessary repeated X-ray analysis, preferably with the fistulography. However, the latter, based on materials of author's development and data of the development of the histories of disease/sickness/illness/malady, with bullet osteomyelitis of the bones of forearm was not applied.

The clinical picture of chronic bullet osteomyelitis of the bones of forearm depended on character/nature and abundance of process, its localization, etc.

Heavily flowed/occurred/lasted the meta-epiphysial osteomyelitis, in particular, in lower third of forearm. Process was characterized by smaller inclination to the delimitation.

To the peculiarity of epiphysial forms of osteomyelitis of the bones of forearm, especially the head of radial bone, indicated P. G. Kornev et al.

With metaphysial osteomyelitis of the bones of forearm is a great possibility of the breach/inrush of suppuration from the subchondral layer. Alternate path, which is observed more frequent with the complicated bullet breaks of radial bone, the propagation of suppurative process on the cracks of bone downward to the radiocarpal joint and the implication of the latter in the inflammatory process.

The diaphysic forms of osteomyelitis of the bones of forearm flow/occur/last more easily, operational access to stricken area is simpler; clinical issues are incomparably better.

Osteomyelitis of both bones of forearm flowed/occurred/lasted heavily, moreover the phenomena of inflammation were very expressed, were observed the frequent outbreaks of infection in the soft tissues (phlegmon, suppurative flows).

Subsequently occurred the extensive cicatrical changes, which were being accompanied by considerable functional disorders. In particular, the cicatrical wrinkling of interosseal diaphragm led to the disorder of pronation and mainly supination.

The effect of bullet osteomyelitis of the bones of forearm affected not only the forearm, but also the hand with which the forearm is connected both in the anatomical and in functional sense. Hand in this case severely suffered, especially if suppurative process in the region of forearm carried chronic character/nature.

Cicatrical changes in the soft tissues of forearm during these processes led to the contractures mainly of fingers. In the available literature and in the data of the development of the histories of the disease/sickness/illness/malady of the information about the microflora of bullet osteomyelitis of the bones of forearm found could not be.

According to the personal observations of the author chronic osteomyelitis of the bones of forearm in the majority of injured people did not cause any considerable changes in the blood. Rarely was noted the moderate increase in the reaction of settling erythrocytes - to 15-18 mm an hour and hardly noted shift/shear of leukocyte formula to the left; temperature in all injured people it

was almost normal, sometimes subfebrile. The general state of injured people in the absence of aggravation or relapse was satisfactory.

If we speak about the severity of clinical picture from the point of view of vital prognosis, then these complications of the bullet breaks of the bones of forearm, according to the data of the development of the histories of disease/sickness/illness/malady, not in one injured person ended by death.

As far as prognosis is concerned functional, then bullet osteomyelitis of the bones of forearm was the severe complication, which had the following special features/peculiarities.

1. Prolonged suppurative process in complex highly differentiated cut of extremity, as (m is forearm, brought to heavy Rubtsovs to changes in muscles, interosseal diaphragm and tendons of flexors of hand, and also to following contractures to limitation of pronation and supination.

2. Fragmented break of bones of forearm, complicated by osteomyelitis, frequently gave pathological corn in the form of spindle with numerous osteomyelitic cavities. Rarely was formed the pathological callus, which leads to narrowing of interosseal gap/interval and extensive cicatricial changes in the interosseal

diaphragm with that following limitation of pronation and mainly supination.

3. General/common/total pathological corn of both bones of forearm caused compression of nerves of forearm, change in muscles and tendons with subsequent contractures predominantly of fingers.

4. Meta epiphysial forms of osteomyelitis of bones of forearm frequently were accompanied by arthritis of radiocarpal joint, by finished ankylosis of latter and by heavy disturbances/breakdowns of functions of hand.

Treatment.

The treatment of the different forms of bullet osteomyelitis of the bones of forearm did not differ from the treatment of osteomyelitis of others tubular bones. The method of selection was the complex treatment in center of which stood operative intervention. however, more than in 25.00/o of injured people with osteomyelitis of the bones of forearm was applied only conservative treatment (table 170).

To surgical intervention underwent almost by 3/4 of had bullet osteomyelitis bones forearms, regardless of the fact what bone was affected, the percentage of the injured people, treated operationally, predominating.

The applied methods of treatment little depended on the form/species of the break which was complicated by bullet osteomyelitis (table 171).

As can be seen from table 171, operations/processes on the bones were conducted most frequently in all forms of heavy breaks. Less frequent these operations/processes underwent injured people with the perforated and edge/boundary break, since osteomyelitis, which complicated these breaks, flowed/occurred/lasted more quietly and frequently it was eliminated under the effect of the conservative methods of treatment.

From the said about the methods treatment of bullet osteomyelitis of the bones of forearm it follows that, after conforming to the local process, by anatomical relationships/ratios, general state of organism, etc., can be applied any of the mentioned methods.

The relationship/ratio of different methods during the different years of war was dissimilar (table 172).

Table 170. Methods of the treatment of bullet osteomyelitis of the separate bones of forearm (in the percentages).

(2) Кость, пора- женная остео- миелитом	(1) Метод лечения	(3) Только консерва- тивный	(4) Операция только на мягких тканях	(5) Операция на кости	(6) Всего
(7) Лучевая		23,5	10,4	66,1	100,0
(8) Локтевая		28,0	7,3	64,7	100,0
(9) Обе кости		31,7	6,8	61,5	100,0
	(10) В среднем . . .	27,4	8,2	64,4	100,0

Key: (1). Method of treatment. (2). Bone, affected by osteomyelitis. (3). Only conservative. (4). Operation/process only on soft tissues. (5). Operation/process on bone. (6). In all. (7). Radial. (8). Cubital. (9). Both bones. (10). On the average.

Table 171. Methods of treatment of bullet osteomyelitis of the bones of the forearm, which complicated the breaks of different type (in the percentages).

(2) Вид перелома, осложнившегося остеомиелитом	(1) Метод лечения	(3) Только консерва- тивный	(4) Операция только на мягких тканях	(5) Операция на костях	(6) Всего
(7) Дырчатый и краевой		30,4	10,9	58,7	100,0
(8) Оскольчатый		31,2	7,4	61,4	100,0
(9) Раздробленный		34,2	2,9	82,9	100,0
(10) Прочие		12,4	13,2	74,4	100,0

Key: (1). Method of treatment. (2). Form/species of break, which was complicated by osteomyelitis. (3). only conservative. (4). Operation/process only on soft tissues. (5). Operation/process on bones. (6). In all. (7). Perforated and edge/boundary. (8). Fragmented. (9). Crushed. (10). Other.

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A number of injured people, in whom apropos of osteomyelitis of the bones of forearm were applied the conservative methods of treatment and operation/process on the soft tissues, progressively was decreased (with 70.6c/o in 1941 to 24.00/o in 1945); in parallel with this was increased a number of injured people, who were undergoing operations/processes on the bones (with 29.40/o in 1941 to 76.00/o in 1945).

Table 172. Methods of the treatment of bullet osteomyelitis of the bones of forearm during the different years of war (in the percentages).

(2) Годы	(1) Метод лечения	(3) Только консерва- тивный	(4) Операция только на мягких тканях	(5) Операция на кости	(6) Всего
1941	60,5	10,1	29,4	100,0
1942	27,2	13,2	59,6	100,0
1943	25,2	6,9	67,9	100,0
1944	24,9	6,7	68,4	100,0
1945	19,2	4,8	76,0	100,0

Key: (1). Method of treatment. (2). Years. (3). Only conservative.
 (4). Operation only on soft tissues. (5). Operation/process on bone.
 (6). In all.

Surgical treatment.

To what degree was increased the necessity for surgical intervention generally and for the repeated operations/processes in particular in connection with the complication of the bullet breaks of the bones of forearm of osteomyelitis, evidently Table 173.

As can be seen from Table 173, with the complication of the bullet break of the bones of forearm of osteomyelitis was increased not only the number of those operated (more than 4 times), but also the quantity of operations/processes, which was falling to one that

operated (from 1.2 to 1.4).

On the need for the surgical treatment of bullet osteomyelitis was voiced Soviet and foreign authors' majority. In the relation to the periods of surgical intervention and its character/nature the views were different.

Surgical intervention before the formation of callus and formation of sequestral box preferred A. T. Lidskiy, V. F. Voyno-Yasenetskiy, I. L. Glezer, V. Ya. Shlapoberskiy et al.

Late surgical interventions when of the callus and formed focus of osteomyelitis is present, recommended M. N. Akhutin, N. V. Antelava, M. O. Fridland, S. A. Novotel'nov, K. S Keropian, etc.

Table 173. Distribution of injured people with bullet break of the bones of forearm, complicated and not complicated osteomyelitis, according to a number of produced operations/processes, except primary treatment (in percent).

(1) Группа раненых	(2) Число операций				(7) Число операций в среднем на одного оперированного	(8) Всего оперированных
	(3) одна	(4) две	(5) три и более	(6) всего		
(9) С остеомиелитом . . .	69,4	23,7	6,9	100,0	1,4	69,9
(10) Без остеомиелита . . .	82,5	15,0	2,5	100,0	1,2	15,8

Key: (1). Group of injured people. (2). Number of operations/processes. (3). one. (4). two. (5). three and more. (6). in all. (7). Number of operations/processes on the average to one that operated. (8). In all operated. (9). With osteomyelitis. (10). Without osteomyelitis.

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Prerequisite/premise for early interventions on forearm served its anatomical-physiological special features/peculiarities: in a comparatively small section is arranged/located a large quantity of highly differentiated tissues (muscles, nerves, etc.).

This noted already N. I. Pirogov, who in the section about the breaks of the bones of forearm wrote: "With the first signs of acute

edema on forearm it is necessary to hurry with the cuts; infiltrates are spread under the dense fascia of forearm and between the layers of muscles much faster than on the shoulder".

According to the data of the development of the histories of disease/sickness/illness/malady, the period of sequestrectomy did not depend on damage/defeat by osteomyelitis of one or the other bone of forearm (Table 174).

As show to Tables 174, to 2 months after the injury of sequestrectomy with bullet osteomyelitis of the bones of forearm it was conducted in the small percentage of injured people and the almost identical frequently for the different bones of forearm. 2 Months after injury it was conducted already 5-6 times more frequent. For all bones of the forearm sequestrectomy was applied most frequently in time from 2 to 3 months from the moment/torque of injury. On the average on each bone sequestrectomy was conducted in 3 months.

Dynamics of the periods of first sequestrectomy on the years of war is represented in Table 175.

Table 174. Period after injury to first sequestrectomy with bullet osteomyelitis of the separate bones of forearm (in the percentages).

(1) Кость, пораженная остеомиелитом	(2) Сроки (в месяцах)							(4) Всего
	1	2	3	4	5	6	(3) 7 и более	
(5) Лучевая	5,3	28,6	32,9	18,4	9,0	2,3	3,5	100,0
(6) Локтевая	4,7	28,5	38,1	18,4	6,8	2,0	1,7	100,0
(7) Обе	5,4	31,5	33,8	15,3	9,5	2,7	1,8	100,0
(8) В среднем . .	5,0	29,2	35,3	17,7	8,1	2,3	2,4	100,0

Key: (1). Bone, affected by osteomyelitis. (2). Period (in months).
 (3). and more. (4). In all. (5). Radial. (6). Cubital. (7). Both.
 (8). On the average.

Table 175. Period after injury to first sequestrectomy with bullet osteomyelitis of the bones of forearm during the different years of war (in the percentages).

(1) Годы	(2) Сроки (в месяцах)							(4) Всего	(5) Число месяцев в среднем
	1	2	3	4	5	6	(3) 7 и более		
1941	6,2	12,5	21,9	21,9	18,8	6,2	12,5	100,0	4,1
1942	1,9	19,2	44,2	19,7	7,7	3,4	3,9	100,0	3,3
1943	4,0	25,8	34,8	19,4	10,7	3,3	2,0	100,0	2,9
1944	7,6	38,0	31,9	14,9	5,7	0,3	1,6	100,0	3,0
1945	6,0	36,8	33,3	16,2	6,0	1,7	—	100,0	2,8
(6) В среднем. . .	5,0	29,2	35,3	17,7	8,1	2,3	2,4	100,0	3,1

Key: (1). Years. (2). Period (in months). (3). and more. (4). In all. (5). Day of months on the average. (6). On the average.

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Of Table 175 is visible the shift/shear within the periods of sequestrectomy from the later in 1941 to the earlier in 1944 and 1945. So, in 1941 sequestrectomy with bullet osteomyelitis of the bones of forearm most of all it was conducted in time from 3 to 4 months, and during the subsequent years - from 2 to 3 months from the moment/torque of injury. If we speak about the later periods of the use/application of sequestrectomies in the dynamics, then, beginning from the 4th month from the moment/torque of injury, they with the years of war were conducted more rarely. On the average within the

time of war the period was lowered from 4.1 months (1941) to 2.8 months (1945).

Simultaneously with earlier on the time production in the operations/processes was repeated/quickened operation in the foremost stages (table 176).

Data of table 176 clearly show the increase of a number of operated injured people apropos of bullet osteomyelitis of the bones of forearm on the years of war in all stages, moreover especially was increased a number of those operated in the army and front region.

As far as character/nature is concerned of surgical intervention, then on this question it was not unified opinion. According to the data of the development of the histories of disease/sickness/illness/malady, surgical interventions presented two groups: to operation/process only on soft tissues (8.20/o) and operation/process on bones (64.40/o); from the latter sequestrectomy composed 62.50/o, resection of the bones of forearm - only 1.90/o.

With acute osteomyelitis of the bones of forearm the procedure which put to use authors' majority, was operational. As a rule, were made wide sections/cuts through which drove out pus free bone sequestrations. On data of the author's development of the histories

of disease/sickness/illness/malady, such intervention underwent 4.00/o all of those operated.

With chronic osteomyelitis the character/nature of surgical intervention was determined by vastness, localization, course of suppurative process, etc. Surgeon's tactics frequently depended on that, there was a callus or it was absent.

On the character/nature of surgical interventions with the different forms of bullet osteomyelitis of the bones of forearm are single indications.

Ya. M. Bruskin preferred resection, considering that most frequently the zone of the breaking up of the bones of forearm was equal to 6-8 cm and that the regeneration of the bones of forearm is good. Period of the reduction of the defects of the bones of the forearm of 2-2 1/2 months. Contradictory/opposite opinion adhered to M. I. Kuslik and Ya. S. Yusevich. The first noted that the regeneration of the defect of radial bone begins extremely rarely; the second during 24 resections apropos of bullet osteomyelitis of the bones of forearm with the bone defect from 2 to 12 cm after 50-70 days observed not in one injured filling of the defect of bone with corn.

Table 176. Frequency of the operations/processes, produced in the therapeutic institutions of different regions during the different years of war apropos of bullet osteomyelitis of the bones of forearm (in the percentages to a number of injured people, the pasts through this stage).

(2) Район эвакуации	(1) Годы					(3) В среднем за всю войну
	1941	1942	1943	1944	1945	
(4) Армейский	5,4	5,7	9,4	7,7	12,7	8,2
(5) Фронтвой	9,2	11,1	17,6	20,0	24,3	16,8
(6) Тыловой	37,6	51,8	66,1	72,0	69,4	62,4

Key: (1). Years. (2). Region of evacuation. (3). On the average for entire war. (4). Army. (5). Front. (6). Rear.

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D. M. Baranovskiy to 156 operations/processes apropos of bullet osteomyelitis of the bones of the forearm only of 4 times made resection of the bone fragments, affected by osteomyelitis. M. M. Bronstein the resection of the bones of forearm is produced in single injured people.

Thus, with chronic bullet osteomyelitis of the bones of forearm it is possible to speak about two basic types of surgical intervention, which were being applied in the Great Patriotic War, sequestrectomy and resections of the affected by osteomyelitis fragments or hollow callus.

It is necessary to consider surgical interventions of preventive character/nature, from which in many respects depended the subsequent formation of osteomyelitis of the bones of forearm (table 177).

Data of table 177 show an increase in the quantity of operations/processes, which preceded sequestrectomy, on the years of

war, it occurring due to more frequent production in the primary surgical processing.

Among the injured people, who were subjected to sequestrectomy, in part in view of insufficiently good results of operation was conducted repeated sequestrectomy (table 178, data of author's development).

Table 177. Operations/processes, which preceded sequestrectomy or resection apropos of bullet osteomyelitis of the bones of forearm during the different years of war (in the percentages).

(1) Годы	(2) Характер операции	(3) Первичная хирургическая обработка	(4) Другие операции	(5) Первичная хирургическая обработка и другие операции	(6) Операция не была	(7) Всего
1941		46,9	9,4	25,0	18,7	100,0
1942		32,2	6,2	13,0	48,6	100,0
1943		52,6	5,7	8,9	32,8	100,0
1944		60,1	5,7	13,3	20,9	100,0
1945		74,4	0,9	14,5	10,2	100,0
(8) В среднем . .		53,3	5,4	12,2	29,1	100,0

Key: (1). Years. (2). Character/nature of operation/process. (3). Primary surgical processing. (4). Other operations/processes. (5). Primary surgical processing and other operations/processes. (6). Operations/processes it was not. (7). In all. (8).

Table 178. Distribution of injured people with bullet osteomyelitis of the bones of forearm according to a number of produced sequestrectomy (in the percentages).

(1) Локализация остеомиелита	(2) Количество севастрентомия	(3) Одна	(4) Две	(5) Три и больше	(6) Всего
(7) Лучевая кость		71,5	17,7	10,8	100,0
(8) Локтевая кость		69,5	20,7	9,8	100,0
(9) Обе кости предплечья		70,4	18,5	11,1	100,0
(10) В среднем		70,2	19,4	10,4	100,0

Key: (1). Localization of osteomyelitis. (2). Quantity of sequestrectomies. (3). One. (4). Two. (5). Three ~~and~~ more. (6). In all. (7). Radial bone. (8). Ulna. (9). Both bones of forearm. (10). On the average.

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From table 178 it is evident that almost in 3/4 injured people was required only the single sequestrectomy regardless of the fact, one bone was affected by osteomyelitis or both bones simultaneously.

Besides sequestrectomies, in recent years of war were adopted resection and processing of the affected by osteomyelitis fragments according to the type the resections.

The majorities of operations/processes on the bones apropos of osteomyelitis of forearm was conducted under the local anesthetization, as is evident according to the data of author's development, represented in Table 179.

From table 179 evidently that with the bullet breaks of one bone, complicated by osteomyelitis, local anesthetization was accepted in more than 75.00/o of injured people, whereas with osteomyelitis of both bones - less than in 50.00/o.

For the filling of bone cavities after operations/processes most frequently were applied sulfanilamide preparations in the powder-like form/species. The second place occupied Viwnyovskiy's ointment; with it bone cavities were poured or were tamped.

If we admissibly connect the issues of surgical interventions with the use/application of one or the other substances for the filling of bone cavity, then this it can be represented by following data of author's development. With the filling of cavity with sulfidine (9.9o/o) began the liquidation of fistulas in 84.0o/o of injured people, with the filling with streptocide (69.5o/o) - in 60.8o/o and with the filling with Viwnyovskiy's ointment (20.6o/o) - in 44.0o/o.

Closing of wound after operation/process apropos of osteomyelitis of the bones of forearm during the Great Patriotic War into the wide practice did not enter.

According to the data of the author's development of histories the diseases/sicknesses/illnesses/maladies, the wound sewed themselves after operations/processes on the bones of forearm in 15.0o/o of injured people. Primary adhesion in this case composed

26.30/o.

After the resection of bone fragments during the imposition of anechoic sutures the wound healed by primary tension in 80.00/o of injured people, after sequestrectomy with the imposition of anechoic sutures - in 31.20/o, after the removal/distance of free bone sequestrations - only in 11.10/o.

Immobilization after sequestrectomy (character/nature and periods of its use/application) depended on that, there was a damage/defeat by one or both bones of forearm, there was consolidation or it was absent.

Table 179. Distribution of injured people according to the character/nature of anesthetization with the operations/processes apropos of bullet osteomyelitis of the bones of forearm (in the percentages).

(1) Число костей пораженных остеомиелитом	(2) Характер обезболивания	(3) Ингаляционный наркоз	(4) Внутривенный наркоз	(5) Фотлярная анестезия	(6) Инфильтрационная анестезия	(7) Итого
8/						
Одна		21,7	2,0	1,3	75,0	100,0
Две		46,3	7,3	2,4	44,0	100,0
10/ В среднем . . .		26,9	3,1	1,6	68,4	100,0

Key: (1). Number of bones of those affected by osteomyelitis. (2). Character/nature of anesthetization. (3). Inhalation anesthesia. (4). Intravenous anesthesia/narcosis. (5). Cover anesthesia. (6). Infiltration anesthesia. (7). Altogether. (8). One. (9). Two. (10). On the average.

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The character/nature of immobilization in the post-operation period is represented in the following form (table 180, data of author's development).

As can be seen from table 180, after operation/process on one bone of forearm more frequently was applied gypsum splint, on both

bones of forearm - anechoic gypsum bandage. The duration of immobilization in the absence of consolidation was 1 1/2-2 months, in the presence of the latter - 2-3 weeks.

Conservative treatment.

Only the conservative treatment of bullet osteomyelitis of the bones of forearm, according to the data of the development of the histories of disease/sickness/illness/malady, was applied in 27.40/o of injured people. The lower percentage of recoveries with the conservative methods of treatment (57.0) in comparison with the operation/process on bone (70.3) gives grounds to again emphasize the need for the complex treatment of bullet osteomyelitis of the bones of the forearm, where one of the components was necessary surgical intervention - sequestrectomy.

With the conservative methods of treatment central place occupied the use/application of different antiseptic substances in the form of solutions and emulsions, and also physiotherapy and therapeutic gymnastics.

From the antiseptic substances they were applied: streptocide - in 2.10/o of injured people, streptocide in the combination with the antiseptic substances - in 27.70/o, sulfidine - in 1.40/o, sulfidine

in the combination with other antiseptic substances - in 3.6o/o,
other antiseptic substances - in 65.2o/o.

Different forms/species of physiotherapy occupied in the conservative treatment of bullet osteomyelitis large place for -54.5o/o; predominated treatment by the light/world: irradiation by sun lamp, quartz lamp; considerably more rarely were applied the waves of ultra-high frequency (UVCh).

The therapeutic exercise was applied in 71.2o/o of injured people.

Prophylaxis.

In volume 15 are presented the materials, which show improvement for the years of the war of the therapeutic measures, directed, in particular, toward warning/prevention of the development of infection in the wound.

Table 180. Distribution of injured people with bullet osteomyelitis of the bones of forearm according to the character/nature of immobilization after sequestrectomy (in percent).

(1) Группа раненых с остеомиелитом	(2) Характер иммобилизации	(3) Шина Крамера	(4) Гипсовая шина	(5) Глухая гипсовая повязка	(6) Итого
Одной кости		10,2	61,6	28,2	100,0
Обеих костей		3,5	34,5	62,0	100,0

Key: (1). Group of injured people with osteomyelitis. (2).

Character/nature of immobilization. (3). Splint of Cramer. (4).

Gypsum splint. (5). Anechoic gypsum bandage. (6). Altogether. (7).

One bone. (8). Both bones.

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Thus, first aid with the bullet break of the bones of forearm for the first hour after injury was shown/rendered during the first year of war 72.20/o of injured people, and during the fourth year of war -84.60/o. A quantity of injured people with the bullet break of the bones of forearm, which obtained the primary surgical processing of wounds, increased with 33.00/o (first year) to 76.40/o (fourth year). Were shortened the periods of the primary surgical processing of the wounds: during the first year of war the primary surgical processing of wounds in the first 6 hours occurred in 17.20/o, in

last year - in 31.10/o of injured people.

Changed the character/nature of primary surgical processing. Thus, a number of dissections and carvings with processing of bone wound increased with 15.3 in 1941 to 22.60/o in 1945.

Therapeutic immobilization by an anechoic gypsum bandage during the first year of war was realized in 26.1 % of injured people, and in last year - in 77.00/o.

This considerable improvement in preventive measures during the war made it possible to consider that the frequency of the complications of osteomyelitis in the years of war will not be increased; however, data of the development of the histories of disease/sickness/illness/malady tell about reverse (table 181).

Table 181 shows an increase in the quantity of the complications of bullet osteomyelitis in the years of war independent of the damage/defeat of one or the other bone of forearm. Most of all this increase was observed in the group of injured people with break of both bones of forearm.

An increase in the frequency of the complications of osteomyelitis in the years of war is explained by the increase of the

severity of injuries in connection with the offensive combat of Soviet army since 1942 to the end of the war.

Actually/really, the frequency of fragmentation injuries with the breaks of the bones of forearms within the time of war it increased with 26.7 (first year) to 36.7o/o (fourth year); a quantity of breaks of the bones of forearms with the foreign bodies within the time of war increased from 15.7 (1941) to 24.9o/o (1945).

Increased a number of associated and combined injuries with 16.3 (first year) to 23.8o/o (fourth year); was noted also a small increase in the number of crushed breaks with 13.3 (first year) to 15.5o/o (third year).

Thus, the noted from year to year improvement in the preventive measures proved to be insufficient for stopping the grown/risen during the war severity of injuries.

Since to prophylaxis and treatment of osteomyelitis during the war was paid the considerable attention, its diagnosis gradually became more advanced; therefore an increase in the years of the frequency of osteomyelitis should be explained also an improvement in the diagnosis.

Issues.

In the issues of bullet osteomyelitis of the bones of forearm it is necessary to distinguish the issue of osteomyelitis as such and degree of the recovery of injured person from the complications and the associated injuries.

Table 181. Frequency of bullet osteomyelitis of the separate bones of forearm during the different years of war (in the percentages).

(1) Локализация перелома	(2) Годы				
	1941	1942	1943	1944	1945
(3)					
Лучевая кость	11,3	22,3	24,7	25,4	31,4
Локтевая кость	11,9	23,2	29,9	31,5	34,2
(4) Обе кости предплечья	17,6	33,7	34,7	37,0	41,5
(6) В среднем	11,9	23,7	27,3	28,5	32,9

Key: (1). Localization of break. (2). Years. (3). Radial bone. (4). Ulna. (5). Both bones of forearm. (6). On the average.

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Dismantling these questions separately, it is necessary to remember that they are result of one and the same process in the human organism as in the unit.

In this light/world, first of all, necessary to dwell on the periods of the formation of the callus with bullet osteomyelitis of the bones of forearm.

A disputable/debatable in the literature question about the effect of infection in the wound on the consolidation of the break by data of the development of the histories of

disease/sickness/illness/malady is resolved in favor of inhibiting effect (table 182).

Consequently, osteomyelitis detained the formation of the callus on the average by 0.7 months.

The frequency of the recovery of bullet osteomyelitis of the bones of forearm depended on the series/number of conditions and during the different years of war it was dissimilar (table 183).

The recovery of osteomyelitis of the ulna was the greatest percentage both on the years of war and on the average.

The second place according to these indicators occupied osteomyelitis of radial bone and latter - both bones of forearm.

The best results of the recovery of osteomyelitis of the ulna in comparison with osteomyelitis of radial and both bones are explained by the fact that with the bullet breaks of the ulna of injuries, which penetrate into the joint, there was least of all (5.10/o), whereas with the breaks of radial bone the penetrating into the joint injuries composed 9.00/o, and with break of both bones - 13.60/o.

Table 182. Average periods (in the months) of the formation of the callus in injured people with the bullet break of the bones of forearm, complicated by osteomyelitis and by not complicated by them.

(1) Группа раненых	(2) Локализация перелома	(3) Лучевая кость	(4) Локтевая кость	(5) Обе кости предплечья	(6) В среднем по пред- плечью
7)					
С остеомиелитом		2,5	2,5	2,9	2,5
(8) Без остеомиелита		1,8	1,7	2,1	1,8

Key: (1). Group of injured people. (2). Localization of break. (3). Radial bone. (4). Ulna. (5). Both bones of forearm. (6). On the average on forearm. (7). With osteomyelitis. (8). Without osteomyelitis.

Table 183. Frequency of the recovery of bullet osteomyelitis of the bones of forearm during the different years of war (in the percentages).

(1) Локализация остеомиелита	(2) Годы	1941	1942	1943	1944	1945	(3) В сред- нем
(4) Лучевая кость		52,2	69,8	65,1	70,1	69,4	65,0
(5) Локтевая кость		47,6	59,8	83,0	66,7	70,0	72,3
(6) Обе кости		52,4	49,5	52,3	60,9	60,0	54,6
(7) В среднем		50,5	61,0	70,1	67,2	67,1	65,4

Key: (1). Localization of osteomyelitis. (2). Years. (3). On the average. (4). Radial bone. (5). Ulna. (6). Both bones. (7). On the average.

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Furthermore, positive role played the fact that the most massive part of the ulna (upper third) was sheltered by soft tissues to the larger degree than the extremital pineal system of radial bone.

Considerable difficulties presented the treatment of bullet osteomyelitis of both bones of forearm, which also decreased the percentage of those curing from it.

The percentage of recovery from osteomyelitis was dissimilar during the use/application of different methods of treatment (table 184).

All methods of treatment from year to year increased a quantity of recoveries in view of all of the improved selection of the necessary method of treatment. On the average a great number of recoveries was obtained after operations/processes on the bones.

Osteomyelitis of the separate bones of forearm was most frequently cured also after operation/process on the bone (table 185).

With osteomyelitis of radial and ulna individually after palliative operations/processes is obtained the higher percentage of recoveries, than after conservative treatment, while with osteomyelitis of both bones more valuable proved to be conservative method.

One of the basic indicators of the advisability of one or the other means of surgical intervention was the liquidation of fistulas.

Table 184. Frequency of the recovery of bullet osteomyelitis of the bones of forearm in connection with the method of treatment during the different years of war (in the percentages).

(1) Метод лечения	(2) Годы					(3) В сред- нем
	1941	1942	1943	1944	1945	
Только консервативный	53,0	49,5	67,5	52,1	68,8	57,0
(5) Операция только на мягких тканях	54,5	47,8	61,3	56,3	75,0	55,5
(6) Операция на костях	43,7	69,2	72,0	73,7	66,1	70,3
(7) В среднем	50,5	61,0	70,1	67,2	67,1	65,4

Key: (1). Method of treatment. (2). Years. (3). On the average. (4). Only conservative. (5). Operation/process only on soft tissues. (6). Operation/process on bones. (7). On the average.

Table 185. Frequency of the recovery of bullet osteomyelitis of the separate bones of forearm in connection with the method of treatment (in the percentages).

(1) Локализация остеомиелита	(2) Метод лечения		(3) Только консерва- тивный	(4) Операция только на мягких тканях	(5) Опера- ция на кости	(6) В сред- нем
(7) Лучевая кость			55,2	60,0	69,2	65,0
(8) Локтевая кость			60,2	63,8	78,4	72,3
(9) Обе кости			54,2	30,8	57,5	54,6
(10) В среднем			57,0	55,5	70,3	65,4

Key: (1). Localization of osteomyelitis. (2). Method of treatment. (3). Only conservative. (4). Operation/process only on soft tissues.

(5). Operation/process on bone. (6). On the average. (7). Radial bone. (8). Ulna. (9). Both bones. (10). On the average.

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On the character/nature of surgical interventions with bullet osteomyelitis of the bones of forearm and issues of these interventions in the relation to the liquidation of fistulas it is possible to judge by tables 186 (author's data).

From table 186 it is evident that almost in the half all injured people (45.30/o) of operation/process they carried radical character/nature (resection and of sequestrectomy) they were directed toward the full/total/complete liquidation of the macroscopically visible focus of osteomyelitis. In these injured people was obtained maximum effect in the relation to the liquidation of fistulas (76.3 and 80.00/o). Less effective proved to be the operations/processes of scraping out and removal/distance of free bone sequestrations. Scraping out was applied in one third all of those operated, because in the larger part of the injured people (42.60/o) osteomyelitis of the bones of forearm was localized in the lower meta-epiphysis where the radical surgery frequently led to the heavy anatomical and functional disturbances/breakdowns.

Scraping out with the preliminary dissection of fistula and the subsequent physiotherapy gave frequently good results, as an example of what can serve the following observation.

S., 19 years, 3/III 1942 obtained the perforating bullet injury of right forearm with break of both bones in lower third. First aid was shown/rendered in proper time. The surgical processing of wounds, transport and therapeutic immobilization is also applied in proper time. After traversing several therapeutic institutions, injured person entered 1/IV 1942 into the Leningrad traumatological institute with osteomyelitis of the head of right ulna. 13/VII 1942 operation/process under the local anesthetization. Section/cut of the soft tissues through the fistula with a length of 2 cm - to the bone. Removal/distance of sequestration from the cavity in the head of the ulna. Sharp/acute spoon produced the scraping out of this cavity. Laminar sutures to the wound; immobilization in the gypsum cast. Wound healed by primary intention. After operation/process the injured person in a good state is discharged with the full/total/complete volume of the motions of forearm and hand.

However, in the majority of injured people after scraping out it was necessary to resort to repeated intervention.

Dissimilar anatomical-physiological relationships/ratios the

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different levels of the separate bones of forearm affected on the results of treatment not very not sharply (table 187).

Table 186. Liquidation of fistulas with bullet osteomyelitis of the bones of forearm in connection with the character/nature of surgical intervention (author's data) (in the percent).

(1) Характер вмешательства и его удельный вес	(2) Связи		
	(3) ликвидиро- ваны	(4) не ликви- дованы	(5) Итого
(6) Радикальная секвестрэктомия (43,1)	78,3	23,7	100,0
(7) Выскабливание костной полости (34,2)	61,0	39,0	100,0
(8) Удаление свободных секвестров (20,5)	63,0	37,0	100,0
(9) Резекция костей предплечья (2,2)	80,0	20,0	100,0
(10) В среднем . . .	69,9	30,1	100,0

Key: (1). Character/nature of intervention and its specific gravity/weight. (2). Fistulas. (3) they are eliminated. (4) they are not eliminated. (5). Altogether. (6). Radical sequestrectomy (43.1). (7). Scraping out of bone cavity (34.2). (8). Removal/distance of free sequestrations (20.5). (9). Resection of bones of forearm (2.2). (10). On the average.

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As can be seen from table 187, osteomyelitis of the bones of forearm in lower third was cured in the larger percentage than osteomyelitis of another localization; exception was only osteomyelitis of the ulna, with which the recovery began more frequently with the localization in middle third. This is explained,

apparently by the presence of lighter access for surgical intervention in lower third for both bones, and cubital, furthermore, and in middle third.

The recovery of osteomyelitis only partially solved the problem about the functional issue of process and about the reduction of the ability to work of this group of injured people.

A whole series of the complications of the bullet breaks of the bones of forearm remained after osteomyelitis or appeared against the background of osteomyelitis (contracture, false joints, arthritis with the subsequent ankylosis of the adjacent joints, etc.).

Good anatomical and functional issues of bullet breaks of the bones of forearm, complicated by osteomyelitis, were observed only in 17.8o/o of injured people; among the breaks of radial bone they composed 15.6o/o, ulna -27.7o/o, both of bones of forearm -6.1o/o (according to the data of the development of the histories of disease/sickness/illness/malady).

Table 187. Frequency of the recovery of bullet osteomyelitis of the bones of forearm at the different level (in the percentages).

(1) Название кости	(2) Уровень перелома	(3) Верхняя треть	(4) Средняя треть	(5) Нижняя треть
(6) Лучевая		65,6	64,4	66,9
(7) Локтевая		72,6	72,9	70,3
(8) Обе кости		49,4	49,6	61,9
(9) В среднем		64,4	65,2	66,8

Key: (1). Name of bone. (2). Level of break. (3). Upper third. (4). Middle third. (5). Lower third. (6). Radial. (7). Cubital. (8). Both bones. (9). On the average.

Table 188. Distribution of injured people with bullet break of the bones of forearm, complicated and not complicated osteomyelitis, according to the clinical issues (in the percentages).

(1) Клиниче- ский исход	(2) Группа раненых	(3) С остео- миэли- том	(4) Без остео- миэли- та
(5) Хороший		17,8	43,2
(6) Контрактура		29,7	27,0
(7) Анкилоз		6,2	2,4
(8) Ложный сустав		5,7	1,6
(9) Культа		0,4	5,8
(10) Остеомиелит		12,5	—
(11) Комбинация		10,1	1,2
(12) Прочие		17,6	18,8
(13) Всего		100,0	100,0

Key: (1). Clinical issue. (2). Group of injured people. (3). With osteomyelitis. (4). Without osteomyelitis. (5). Good. (6).

Contracture. (7). Ankylosis. (8). False joint. (9). Stump. (10).
Osteomyelitis. (11). Combination. (12). Other.

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Osteomyelitis was severe complication in injured people with the bullet break of the bones of forearm and led to considerable deterioration in the clinical issues in comparison with those injured people, who this complication did not have.

Data of table 188 make it possible to, first of all, refine the issues of the breaks of the bones of forearm, complicated by osteomyelitis. As has already been indicated, in 65.40/o of injured people up to the moment/torque of extraction from the hospital osteomyelitis was eliminated; in 34.60/o osteomyelitis as basic issue it composed 12.50/o, i.e., in these injured people osteomyelitis was in the active form with the fistulas; consequently, in the stage of liquidation without the fistulas osteomyelitis with the extraction was observed in 22.10/o of injured people.

In the group of the injured people, who did not have osteomyelitis, were noted the best clinical issues according to many indicators (more than 2 1/2 times of good issues, it is less than contractures, ankylosis, false joints, combinations of poor issues),

but proved to be a larger quantity of stump of forearm.

If one considers that the majority of amputations in the group of the injured people, who did not suffer osteomyelitis, was produced early, when to recognize osteomyelitis was difficult, then the difference in the clinical issues will change still more considerable in favor of injured people for which it was possible to avoid the complications of osteomyelitis.

The best clinical issues in injured people with the bullet break, which were complicated by osteomyelitis, were obtained with the breaks of the ulna, and worse - with breaks of both bones. Thus, for instance, good anatomical and functional result with osteomyelitis of the ulna composed 27.70/o (in a number of other issues), radial bone - 15.60/o, both of bones - 6.10/o.

The clinical issues of the bullet breaks of the bones of forearm, complicated by osteomyelitis, with each year of war were improved (table 189).

Table 189. Distribution of injured people with the bullet break of the bones of forearm, complicated by osteomyelitis, according to the clinical issues during the different years of war (in the percentages).

(1) Годы	(2) Клинический исход									
	(3) Хорошая	(4) Контрактура	(5) Анкилоз	(6) Ложный сустав	(7) Культи	(8) Остеомиелит	(9) Комбинация	(10) Прочие	(11) Всего	(12)
1941	13,6	24,8	5,6	8,8	1,6	24,8	12,8	8,0	100,0	
1942	17,0	31,4	5,6	4,4	—	17,4	12,1	12,1	100,0	
1943	20,2	30,0	7,2	5,0	0,8	9,3	8,1	19,4	100,0	
1944	21,0	29,7	6,0	5,8	0,2	9,3	10,2	17,8	100,0	
1945	16,9	27,3	6,0	8,6	—	10,5	9,7	21,0	100,0	
В среднем . . .	17,8	29,7	6,2	5,7	0,4	12,5	10,1	17,6	100,0	

Key: (1). Years. (2). Clinical issue. (3). Good. (4). Contracture. (5). Ankylosis. (6). False joint. (7). Stump. (8). Osteomyelitis. (9). Combination. (10). Other. (11). In all. (12). On the average.

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An improvement in the clinical issues of the bullet breaks of the bones of forearm, which were complicated by osteomyelitis, depended on the use/application of the more advanced methods of treatment, since the severity of injury with the years was increased.

The average duration of the stay of injured people in the

hospitals is the indicator of the severity of injury and quality of treatment. Literature on this question is contradictory (table 190).

Among the given numerals are secreted the numerals of Ya. B. Ryvlin and D. A. Kogan. For the first author the discussion deals with injured people with the isolated/insulated break of radial or ulna, that finished treatment in the front rear, while in the second - only about injured people whose treatment ended by full/total/complete recovery.

Data of the development of the histories of disease/sickness/illness/malady are represented in Table 191.

From table 191 it is evident that the average duration of hospital treatment in comparison with the data of authors' majority (table 190) was less. On the years of war were observed small oscillations, but invariably/unchangedly was noted reduction, with exception 1943, when the average duration of treatment was somewhat larger in comparison with the preceding/previous and subsequent years; after 1943 set in a stable reduction in the duration of hospital treatment, which is explained by a contraction/abbreviation of periods from the moment/torque of injury to the operation/process and by an increase in the number of radical surgery, applied in this contingent of injured people.

Table 190. Periods of hospital treatment apropos of bullet osteomyelitis of bones of forearm (according to different authors' data) (in the days).

(1) Автор	(2) Место наблюдения	Сроки лечения
4) Я. Б. Рывлин	Фронтальной тыл	85—91
5) М. И. Куслик	Ближний тыл	155
6) Н. Х. Алексеев	Ближний тыл	158
7) С. П. Ходкевич	Глубокий тыл	159
8) М. М. Бронштейн	Ближний и глубокий тыл	161—169
9) В. Д. Анчелевич	Глубокий тыл	184
10) Д. А. Коган	Ближний тыл	286

Key: (1). Author. (2). Observation point. (3). Periods of treatment.
 (4). Ya. B. Ryvlin. (5). M. I. Kuslik. (6). N. Kh. Alekseyev. (7). S. P. Khodkiewicz. (8). M. M. Bronstein. (9). V. D. Anchelevich. (10). D. A. Kogan. (11). Front rear. (12). Near rear. (13). Deep rear. (14). Near and deep rear. (15). Deep rear.

Table 191. Average duration of hospital treatment apropos of the bullet break of the bones of the forearm, complicated by osteomyelitis, during the different years of war (in the months).

(1) Локализация остеомиелита	(2) Годы	1941	1942	1943	1944	1945	(3) В среднем
4) Лучевая кость		5,3	4,9	5,0	4,7	4,3	4,8
5) Локтевая кость		4,8	5,0	5,1	4,6	4,6	4,9
6) Обе кости		5,3	4,5	5,1	4,7	4,5	4,6
7) В среднем		5,1	4,8	5,0	4,6	4,5	4,8

Key: (1). Localization of osteomyelitis. (2). Years. (3). On the

(5) Cubital bone)
average. (4). Radial bone. ⁶ (5) both bones. (7). On the average.

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The average duration of hospital treatment during the use/application only of a conservative method and during the treatment operationally barely differed.

On the whole the complication of osteomyelitis of the bullet breaks of the bones of forearm increased the average period of hospital treatment by 1.6 months, since in the group of the injured people, who did not have this complication, average period was equal to 3.2 months.

BULLET OSTEOMYELITIS OF THIGH.

Honored Scientist professor Colonel MC M. I. Kuslik.

Statistical survey/coverage.

Bullet osteomyelitis was the most frequent and very severe complication of the bullet breaks of thigh.

According to the data of the development of the histories of

disease/sickness/illness/malady, the frequency of bullet osteomyelitis of thigh depending on the content, put in into the concept "bullet osteomyelitis", is from 31.1 to 56.1o/o.

In volume 2 of "work" (pg. 282) it is said: "under the common designation "bullet osteomyelitis" are united the very diverse pyoinflammatory complications, observed after bullet injuries with the damage of bones".

During this determination of bullet osteomyelitis its frequency is calculated into 56.1o/o. With stricter differentiation and exception/elimination of injured people with the septic course of break (chapter V) the frequency of osteomyelitis is calculated into 31.1o/o with respect to all breaks of thigh.

The frequency of osteomyelitis of thigh according to the information, published for the time of war by the numerous authors, oscillates from 29.1o/o (A. I. Sirts) to 90.0o/o (V. D. Anchelevich). This oscillation, besides different representation about the essence of bullet osteomyelitis, is explained also by the fact that the information, communicated by the authors, relates to the dissimilar periods of war and the different stages of evacuation.

Thus, toward the end of the war in some evacuation hospitals of

the internal regions of the country were concentrated the injured people with bullet osteomyelitis, who composed in these stages the basic contingent of injured people.

In hospitals of one of the fronts M. I. Kuslik and D. G. Rokhlin established/installed the following forms of the course of the breaks of the thigh: according to the type of closed break -13.50/o, restricted pyonecrotic process of -5.40/o, bullet osteomyelitis -50.10/o, are not explained -31.00/o. Thus, in the hospitals of this front hospital basis only into 69.00/o of all breaks of thigh it was possible to establish/install the pattern of their flow. In the relation to remaining 31.00/o of all breaks, although in the overwhelming majority of injured people they flowed/occurred/lasted favorably, to establish/install the form of course was impossible on the different reasons: clinical course was not sufficient to characteristic ones, X-ray photographs were in an insufficient quantity or low quality; reason was most frequently the insufficient period of observation. As showed experiment/experience, with the breaks of thigh during the correct processing, with the early and good immobilization the infection sometimes did not become apparent during the very lasting time. Were observed separate breaks with the smooth course and the stable roentgenological symptoms - by osteonecrosis and by osteolysis - in the course of 2 months; only on the 3rd month the state of injured person began to deteriorate, and

in the X-ray photographs could be seen manifestation and propagation of the symptoms of bullet osteomyelitis.

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Therefore the studied breaks of thigh related to one or the other form of course only in the presence of indisputable clinical X-ray data. All doubtful on the course and the issues injuries were connected with the group of the undetermined results. By this is explained so high a percentage of injured people (31.0) in this group.

In further stages was explained finally the course of break, in connection with which changed the percentage of bullet osteomyelitis.

During the comparison of the data about the frequency of osteomyelitis of thigh, published by the different authors, is established/installed a regular increase in the percentage of osteomyelitis in the therapeutic institutions on the evacuation routes in the direction into the deep rear, which occurred both as a result of the development/detection previously the concealed/latent forms and as a result of concentration, requiring the prolonged treatment injured people, whose injuries were complicated by osteomyelitis.

Priority in the comprehensive development of a question about bullet osteomyelitis belongs to the Soviet authors.

In the previous wars furnished information on themselves only about the infected breaks. In the first world war K. Franz (C. Franz) established that in German army 90.00/o of all bullet breaks the thighs were infected and they flowed/occurred/lasted with the festering. L. Boehler (L Bohler) determined a quantity of infected breaks of thigh into 83.00/o. In the Russian army M. I. Ladygin on the Simbir hospital of red cross established 86.60/o of festerings with the bullet breaks of thigh. S. M. Rubashov communicated about 68.00/o of osteomyelitis of thigh in the first world war.

In the civil war in Spain (1936-1938) Kh. Vidal (H Vidal) observed festering in 75.00/o of injured people with the bullet break of thigh.

During the war with White Finns (1939-1940), when injured people were situated under exclusively favorable conditions in the relation to of rapid rendering to surgical aid and urgent delivery/procurement into the closely spaced clinics and the wonderfully equipped institutions of Leningrad, V. G. Weinstein observed osteomyelitis

with the bullet breaks of thigh in 22.20/o of injured people and in 52.70/o of those long ached.

In the Second World War O. Vustman (O. Wustman) in the Fascist-German army, in the material of the German specialized hospitals, determined a quantity of infected breaks of thigh into 75.00/o.

Some conditions of the onset of bullet osteomyelitis of thigh.

Form/species and character/nature of injury, aid of leading stages of evacuation.

The breaks of thigh, caused by bullet, were complicated by osteomyelitis in 29.80/o of injured people, and caused by fragment - in 31.90/o. Breaks with the perforating injury were complicated by osteomyelitis in 31.00/o, and with the blind - in 33.30/o of injured people.

Consequently, the appearance and nature of the wound did not play a substantial role in the emergence of osteomyelitis.

The level of break had only indirect value in the development of osteomyelitis. Thus, at the almost identical frequency of osteomyelitis with the breaks of thigh in upper (33.40/o) and middle third (34.8) was noted its lower frequency with the breaks lower third (24.80/o). This position is completely explained by the fact

that with the injury in lower third of thigh the penetrating into the joint breaks were encountered considerably more frequently than with the injuries at other levels (vcl. 15, pg. 332).

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As is known, the bullet breaks, complicated by gonitis, frequently led to the heavy issues (amputation, death).

In the onset of osteomyelitis great value had the form/species of the break: so, small-splintered breaks were complicated by osteomyelitis in 47.00/o of injured people, large-splintered - in 45.70/o, cross - in 41.50/o, oblique - in 32.20/o, crushed - in 29.20/o, edge/boundary - in 28.60/o and perforated - in 27.40/o. The degree of the breaking up of bone, it is doubtless, influenced the development of bullet osteomyelitis.

Lower percentage (29.2) of osteomyelitis with the crushed breaks is explained by the fact that with this form/species of breaks more frequently than with others, was observed early death and more frequently was conducted amputation during the primary processing.

The value of the degree of the breaking up of bone in the onset of bullet osteomyelitis and severity of its course and issue to the

known degree is confirmed by the distribution of dead persons from bullet osteomyelitis according to the character/nature of the break of the thigh: to the perforated and edge/boundary breaks it is 7.4o/o of dead persons, to the fragmented ones and crushed - 82.8o/o and to other breaks - 9.8o/o.

Consequently, all forms/species of the break of thigh could be complicated by osteomyelitis, capable of leading to the lethal outcome, even perforated and edge/boundary; however the greatest danger presented the fragmented and crushed breaks.

For the frequency of the development of osteomyelitis, besides the degree of decomposition the guests, exerted influence also degree of the decomposition of soft tissues; however, prevailing value remained after the decomposition of bone.

For studying the conditions the developments of bullet osteomyelitis on S. S. Girgolav's proposition in 1944 by the author were inspected in EG 10000 injured people with the break of different localization. In this case were established/installed the following relations: with extensive crushing of soft tissues and the simple break of bone the complication of osteomyelitis was observed in 61.0o/o of injured people; with insignificant crushing of soft tissues and the crushed break the percentage of the complications of

bullet osteomyelitis attained 70.0; finally, during the combination of extensive crushing of soft tissues with the large breaking up of bone bullet osteomyelitis was encountered in 77.00/o of injured people.

In the onset of bullet osteomyelitis sizable value, according to the data of the development of the histories of disease/sickness/illness/malady, had the foreign bodies in presence of which osteomyelitis was observed in 44.00/o of injured people, while the average percentage of the complications of osteomyelitis composed 31.1.

To establish the dependence of the development of osteomyelitis on the periods of rendering of first aid and use/application of transport immobilization according to the data of the development of the histories of disease/sickness/illness/malady was impossible, it was possible to only come to light/detect/expose the more frequent onset of osteomyelitis in injured people by which was laid improvised splint (47.70/o), in comparison with injured people whose fixation was conducted by the Diedrichs' splint (34.20/o).

Most important link in the circuit of preventive measures with the bullet breaks of thigh was as with other injuries, primary surgical processing; therefore one should know, to what degree were

reflected the periods (table 192) and the character/nature (table 193) of primary surgical processing in the frequency of the complications of osteomyelitis.

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Data of table 192 convincingly show an increase in the number of complications of osteomyelitis in connection with the elongation of time from the moment/torque of injury to the primary surgical processing. Is completely logical for the multi-fragmented breaks the general/common/total increase in the quantity of the complications of osteomyelitis, but at the same time in this group of injured people the percentage of the complications of osteomyelitis is also increased with respect to the elongation of the periods of primary surgical processing. Attention is drawn to in both groups a comparatively small percentage of osteomyelitis in injured people, who were not undergoing the primary surgical processing (20.1 with all breaks and 31.6 - with the fragmented ones).

As is known (vol. 15, chapter V), did not undergo primary processing predominantly injured people whose injuries were accompanied by the smaller decomposition of bone and soft tissues.

Given data of the development of the histories of

disease/sickness/illness/malady again confirm the already indicated above dependence between the degree of the damage of soft tissues and bone and the development of osteomyelitis.

During the analysis of the primary surgical processing of the bullet breaks of thigh, complicated by osteomyelitis, it is necessary to note that the primary surgical processing was produced on DMP only in 76.30/o of injured people; 23.70/o of injured people underwent primary surgical processing and immediately was obtained the final specialized aid in ^{KA} PPG and EG.

On the effect of the character/nature (content) of the first surgical processing of the bullet breaks of thigh on the frequency of the subsequent development of osteomyelitis it is possible to judge by Table 193, comprised on the basis of data of the development of the histories of disease/sickness/illness/malady.

Table 192. Frequency of the development of bullet osteomyelitis of thigh in connection with the period of production in the primary surgical processing (in the percentages).

(1) Группа раненых	(2) Сроки обработки		(3)	(3)	(4)	(5)	(6)	(7)	(8)
	6 часов	7-12 часов	13-24 часа	Первые сутки (час не установлен)	В среднем в течение первых суток	Позднее 24 часов	Обработка не производилась		
9) Все раненые с переломом бедра	28,4	32,7	34,9	29,9	32,2	37,7	20,1		
Раненые с оскольчатым переломом	38,9	45,3	46,5	—	41,8	54,3	31,6		

Key: (1). Group of injured people. (2). Periods of processing. (3) hours. (4) hour. (5). First day (hour is not established/installed). (6). On the average during first day. (7). Are later than 24 hours. (8). Processings it was not conducted. (9). All injured with break thighs. (10). Injured people with fragmented break.

Table 193. Frequency of the development of bullet osteomyelitis of thigh after different character/nature of primary surgical processing (in the percentages).

(1) Группа раненых	(2) Характер обработки		(3)	(4)	(5)
			Рассечение и иссечение	Рассечение и иссечение с обработкой костной раны	Обработка не производилась
(6) Все раненые с переломом бедра			33,8	41,5	20,1
Раненые с оскольчатым переломом			43,0	48,7	31,6

Key: (1). Group of injured people. (2). Character/nature of processing. (3). Dissection and carving. (4). Dissection and carving with processing of bone wound. (5). Processings it was not conducted.

(6). All injured with break taighs. (7). Injured people with fragmented break.

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Thus, it is possible to note a completely natural increase in the percentage of the complications of osteomyelitis in the injured people with the fragmented break in all forms of processing.

General/common/total for indicators of both groups of injured people is the progressive with an increase of the activity of primary surgical processing frequency of complications osteomyelitis. The best results were observed in those injured people who primary surgical processing did not undergo; more than the complications of osteomyelitis is noted with the dissections and the carvings and worst of all in this respect there were results during the simultaneous processing of the wound of soft tissues and bone wound. This position can be explained by the fact that the degree of surgical activity during the primary surgical processing grew/rose with respect to the degree of the severity of the damage, obtained with the injury. Then becomes clear the heavier course of breaks after active processing.

Together with the early and advisable surgical processing, the

decisive role in further fate of injured person with the break of thigh played a good gypsum bandage. The earlier the transport immobilization was replaced by gypsum bandage, the less it was complications osteomyelitis.

Thus, according to the data of the development of the histories of disease/sickness/illness/malady, with the application of gypsum dressing apropos of the bullet break of thigh during the first 10 days after injury osteomyelitis was observed in 34.90/o of injured people, during the imposition in the period from the 11th to the 20th day - in 42.10/o, from the 21st day it is later - in 46.30/o.

Analogous data are brought by the different authors (A. T. Lidskiy, M. I. Kuslik et al.). However, it is necessary to have in mind that they have only relative value, since in this case is not indicated the character/nature of the break; considerably was encountered such injured people, which due to the severity of injury the early application of gypsum dressing was contraindicated.

The large progress in the treatment of the bullet breaks of thigh was introduction and improvement of the procedure of the secondary surgical processing, which was being conducted in the nearest stages of evacuation. The preventive value of reworking in the relation to osteomyelitis vividly affected with each year of war

the decrease of a number of injured people with osteomyelitis in the back hospitals. In this respect are convincing A. T. Lidskiy's data: in 1942 after the admission into the back hospitals (Sverdlovsk) osteomyelitis was established/installed in 65.00/o of injured people with the break of thigh, in 1943 - in 46.00/o, and in 1944 - in 38.00/o. So considerable a reduction in the frequency of osteomyelitis, it is doubtless, was the consequence of the organizational measures, which contributed to the successful work of the surgeons of foremost stages, as a result of which with the course of war was decreased the need for evacuating injured people with osteomyelitis into the deep rear.

Clinic, diagnosis and course.

In the clinical course of bullet osteomyelitis of thigh were distinguished two basic forms - sharp/acute and chronic; the latter subsequently frequently gave heavy aggravations.

According to the data of the development of the histories of disease/sickness/illness/malady, of 31.10/o of injured people with osteomyelitis sharp course was observed in 6.00/o (i.e. in 1/5).

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Frequently the development/detection of the primary form of acute osteomyelitis presented considerable difficulties. This depended on the difficulty of the analysis of the clinical picture of the bullet break of thigh, which takes place with the complication. The manifestations of bullet osteomyelitis were combined with the festering in muscles and joints; they were laminated to each other, and therefore the determination of the leading process proved to be problem not of the lungs.

The clinical picture of acute osteomyelitis, which was being developed after the bullet break of thigh, differed from the well known picture of acute hematogenic osteomyelitis depending on different pathogenesis of these means of the suppurative damage/infest of bone. With bullet osteomyelitis usually it was not noted this rapid development of process and sharp/acute pains as with hematogenic osteomyelitis. This occurred, in the first place, because the suppurative process was more frequently developed first in the soft tissues; in the second place, the wound canal, expanded during the surgical processing, more or less provided the outflow of suppurative discharge; in the third, the suppurative process, which developed in the bone, certain time remained localized. This is why the clinical recognition of the degree of the participation of osteomyelitis itself in the sharp course of bullet break was difficult.

In the development of the sharp/acute form of osteomyelitis of bullet origin were observed two clinical variants. With the first variant in injured people within the next few days after injury highly heaved the temperature and appeared other symptoms of the general/common/total intoxication which found to itself explanation only in the suppuration of soft tissues. In such injured people they sometimes revealed ulcer in the soft tissues and was driven out foreign body; however, after these interventions of improvement it did not begin. It remained to think only about the suppurative process in the bone. X-ray examination solved problem; the roentgenological signs of acute osteomyelitis is progressive osteonecrosis and osteolysis without the periosteal reaction and the endosteal sclerosis against the background of the clinical picture of sharp/acute inflammatory process.

As an example can serve the following observation.

D., 21 year, 8/III 1944 is injured by bullet into the left thigh. Multi-fragmented break of bone. The primary surgical processing of the wound of soft tissues is produced on DMP to the second day. Next day in the Diedrichs' splint the injured person is directed in PPG. Is there in view of the high temperature produced

11/III secondary surgical processing (revision of wound, removal/distance of bone fragments) and is superimposed anechoic gypsum bandage. Temperature on the mornings of approximately 38°, in the evenings of approximately 39° firmly was held to the end of April. State of injured person heavy, hemoglobin 35o/o, leukocytes 12300. Repeated transfusion of the blood, introduction of glucose, streptocide. During May the temperature continued to oscillate in limits of 37.1° on the mornings and by 37.6° in the evenings. In the X-ray photographs of 29/V (Fig. 34) were determined the sequestrations in the region of the break of femoral bone, osteonecrotic sections in the ends of the basic fragments, periosteal reaction it was expressed weakly. Diagnosis: bullet osteomyelitis. On the basis of diagnosis 5/VI is produced the operation/process of necrosequestreectomy. After operation/process the state of injured person began gradually to be improved, temperature was lowered to the norm. Wounds healed, but remained fistula. 7/X it was produced the repeated operation/process of sequestrectomy; fistula was soon closed. 22/XII 1944 injured person it was discharged from the hospital: walks with the bacillus/rod, shortening 5 cm, the rigidity of knee joint, fistula it is closed.

Distant result after 5 years of 3 months. D. walks freely, not using support (by stick), it is equipped with orthopedic foot-wear for the compensation for shortening, no complaints he presents,

fistula was not opened/disclosed, flexure in the knee joint to 90°. In the X-ray photographs (24/VI 1949) is revealed/detected the grown together break of thigh with the dias, there are no signs of osteomyelitis (Fig. 35).

In the second variant sharp/acute process appeared otherwise. Following the injury came calm period without the special general/common/total symptoms, and then, after the considerable period, was developed the clinical picture of acute osteomyelitis.

As an example can serve the following observation.

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P., 22 years old, 9/III 1945 obtained the perforating bullet injury of middle third of right thigh with the multi-fragmented break of bone. After 6 hours is produced the primary surgical processing of the wound of soft tissues. On the next day the injured person was evacuated in the splint of Dieterichs in PPG. During the day of admission 10/III on the orthopedic table was produced the correction of strain, was superimposed the anechoic gypsum bandage, which for a period of the subsequent 4 1/2 months changed 4 times. The state of injured person within the time of treatment was satisfactory. Temperature during March and April was held in limits of 37.2° on the mornings and to 37.8° in the evening, rarely giving increase to 38°. At the end of April and beginning of May was begun an increase in the temperature in the evenings to 39° and it is above; appeared pains. In the X-ray photographs of 16/V were determined the sequestrations in the zone of break and the sections of osteonecrosis at the ends of the scrap (Fig. 36). 11/VI is produced the radical surgery of necrosequestrectomy, which was being accompanied by chipping of the ends of the basic scrap. In the X-ray photograph of 24/VII 1945 was determined the grown together break of femoral bone, the callus only

on the internal edge of bone, in the zone of defect the sequestration (Fig. 37). 1/XI 1975 injured person is discharged from hospital with the shortening of foot on 6 cm, with fistula and sharp difficulty of movement of knee joint. Through 2 years of 4 months after the extraction it is produced sequestrectomy, after which the fistula no longer was opened/disclosed. In the X-ray photograph through 3 years of 9 months after injury is revealed/detected the grown together break of thigh without the signs of osteomyelitis (Fig. 38). Only complaint of the limitation of motions in the knee joint (were preserved only oscillating motions). It works on the previous profession (metal worker).

It should be noted that the development of sharp/acute osteomyelitis was not always accompanied by the corresponding to it clinical picture. In the anergic state of injured person with the presence of wound depletion, in spite of the severity of process, it could flow/occur/last without the high temperature, without leukocytosis and shift/shear of leukocyte formula to the left. The only signs, which darken the apparent prosperity, were the rapidly grown on anemia and depletion of injured person, which imperious dictated the need for urgent radical operational intervention, most frequently to amputation.

The clinical picture of chronic bullet of osteomyelitis is

commonly known, the recognition of it is simple. In anamnesis - bullet break. In the satisfactory general state, with the normal or subnormal temperature, in the absence of changes from the side of the blood and urine on the spot of injury was observed the soldered with the bone drawn in scar with the fistula and suppurative discharge.

Roentgenologically chronic osteomyelitis of thigh was characterized by progressive osteonecrosis and osteolysis with the scaled and fringed periosteum. Are especially characteristic for the chronic forms were insuring periosteal layerings and cavities with the endosteal sclerosing reaction and the sequestrations.

Should be focused attention on the rare form of chronic osteomyelitis when inflammatory process proceeded very concealed/latent and for long it was not distinguished in the X-ray photographs. This was observed with the tangential injury of the periosteum and surface strata of cortical substance or upon transfer of suppurative process to the bone tissue from a deep phlegmon of soft tissues.

Pl., 35 years old, 6/IV 1942 it is injured into the left thigh. Diagnosis: the perforating bullet injury of the soft tissues of left thigh on the boundary of upper and middle third. In the X-ray photograph of 27/IV the disturbances/breakdowns of the integrity of

bone were not discovered. 6 Months after injury it is discharged into the monthly tempering. Upon the return from the tempering was established/installed the presence of the fistula apropos of which it only in 2 months the donkey of tempering, i.e., in the beginning of January of 1943, was evacuated and placed into the surgical separation/section of evacuation hospital. In the aiming X-ray photograph after the admission is discovered the restricted section of the scaled periosteum, also, under it small oblong sequestration on the periphery of bone. After X-ray therapy - steady recovery.

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The defect of diagnosis here should be considered the absence of repeated X-ray analysis, which considerably earlier could show implication in the inflammatory process of bone tissue, and the in proper time undertaken treatment could considerably accelerate the recovery of injured person.

Not always similar injuries were finished so/such happily. In some injured people, it is more frequent with the blind-end fragmentation injury with the insignificant surface damage of the cortical layer of bone, was developed the disseminated osteomyelitic process, which striked diaphysis for the considerable elongation/extent. In such injured people the course of osteomyelitis

was very heavy, moreover overall phenomena - high temperature, staggering chill, pouring perspiration, rapidly progressive anemia, high ROE and expressed characteristic changes in the formula of the white blood - sharply predominated over the local phenomena.

In the region of wound, usually already small and filled with granulations, special changes it was not observed; in the affected extremity were noted edema and pains. On the whole clinical picture very resembled sharp/acute hematogenic osteomyelitis. During the operation/process was detected the necrosis of bone and the phlegmon of bone marrow, sometimes for the considerable elongation/extent.

It is possible that with these injuries in the depth of tissues were created the conditions of the closed cavity with the elevated pressure, which contributed to the penetration of infection on the Haversian canals and its further propagation.

P-40, 32 years, is injured 24/VIII 1943. Diagnosis, set in the foremost stages: the blind-end fragmentation injury of the soft tissues of left thigh. It entered in a month in the EG in the state of average/mean severity, with the large suppurative flow. In the X-ray photograph of 24/IX is discovered metallic fragment and small edge/boundary defect of the cortical layer of thigh (Fig. 39). 27/IX the operation/process: the disclosure/expansion of flow, the

removal/distance of metallic fragment and the scraping out of bone in the region of defect. After operation/process the state of injured person was not improved. Soon was begun the staggering chill, perspiration, anemia it grew on. In the X-ray photograph of 15/X came to light the typical picture of osteomyelitis with osteonecrosis and osteolysis, which seizes entire transverse part of diaphysis, and by the periostitis, which were disseminated to entire its middle third. On the middle of thigh pathologic fracture (Fig. 40). 16/X is produced the wide trepanation of thigh with the resection of the entire affected bone and the removal/distance of phlegmonously changed bone marrow. Is superimposed anechoic gypsum bandage.

It is very slow, after the repeated transfusions of blood, glucose and physiological solution, and also use/application of sulfanilamide preparations, the state of injured person was improved, in 3 months it was evacuated into the rear in the satisfactory general state, with the consolidated break, with the roentgenologically established/installed restricted osteomyelitic process, with the fistula.

The failure of the first operation/process, possibly, depended on insufficient radicalism both relative to the disclosure/expansion of soft tissues and boundaries of the removal/distance of the affected bone.

Two latter/last observations draw the picture of the extreme variants of the course of osteoperiostitis of thigh. Similar observations published also T. A. Malyugina, A. M. Zhabotinskiy et al.

In the overwhelming majority of these injured people as a result of the integrity of the basic array of bone diagnosed itself of the injury of soft tissues. It should be noted that the delayed healing of wound could depend not only on suppurative process in the bone, but also on the presence of the metallic fragments, and also other foreign bodies, shadowproof in the X-ray photograph. In such injured people the final establishment of diagnosis helped fistulography, that gave indication of localization of the source, which maintained the existence of fistula.

In conclusion should be noted the isolated by D. G. Rokhlin peculiar form of the total central necrosis of thigh.

Page 288a.

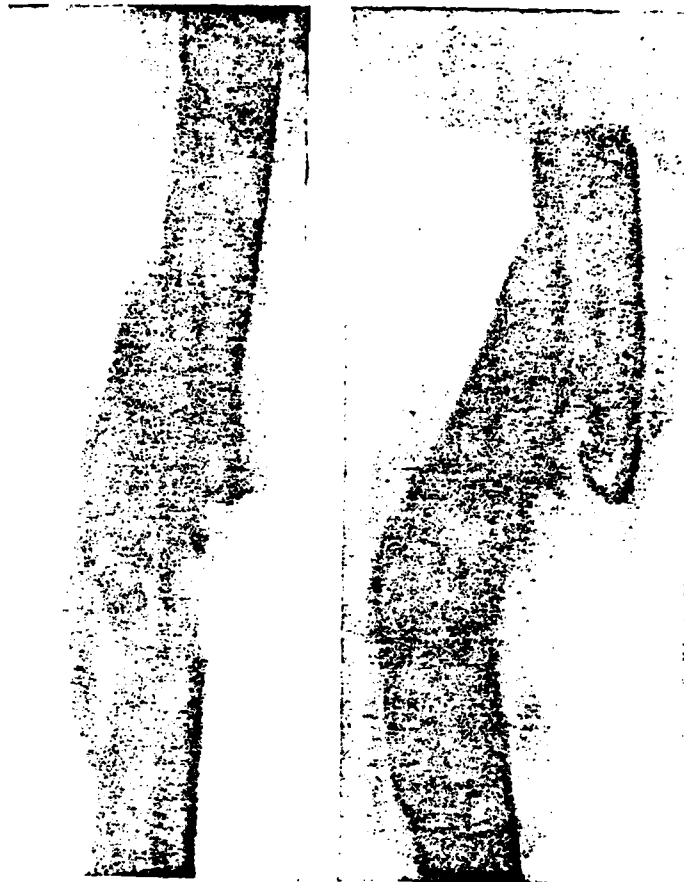


Fig. 34. P., 21 year. 2 1/2 Months after injury. In the region of the break of left thigh sequestrations, osteonecrotic sections at the ends of the basic fragments. Weak periosteal reaction.

Page 288b.

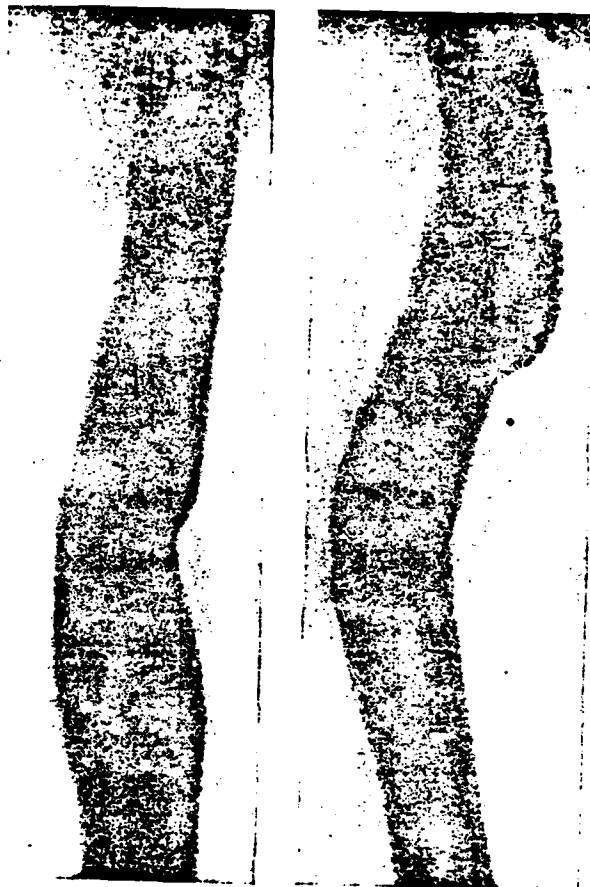


Fig. 35. The same injured person. After 5 years 3 months.

Page 288c.

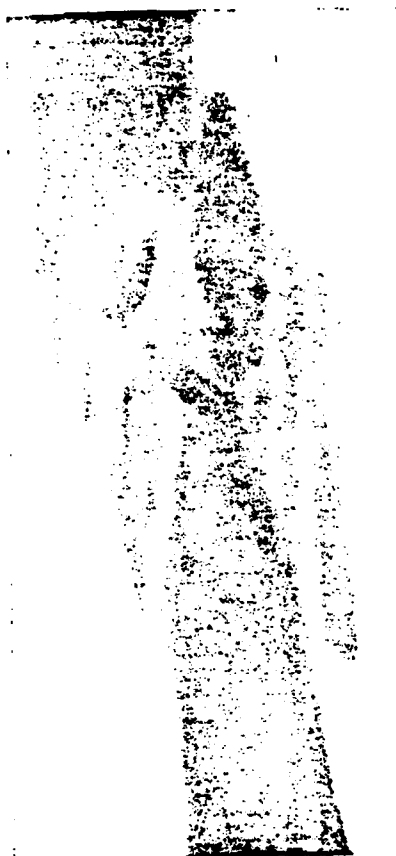


Fig. 36.

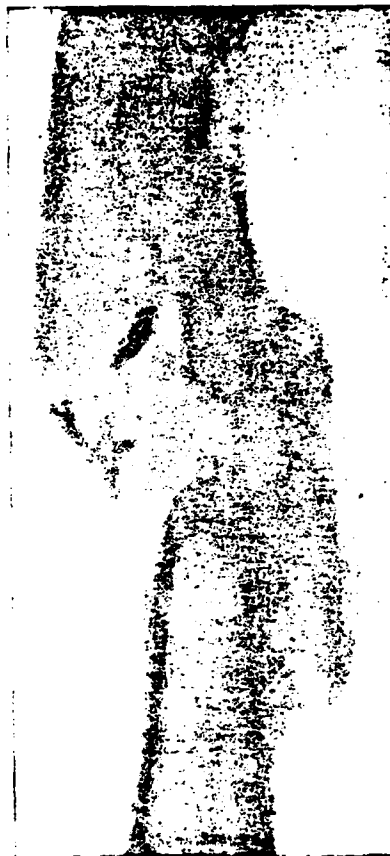


Fig. 37.

Fig. 36. P., 22 years. Photograph 2 months after injury. Bullet osteomyelitis of right thigh.

Fig. 37. The same injured person. X-ray 2 1/2 months after radical necrosequerectomy.

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Fig. 38. The same injured person. X-ray photograph through 3 years of 9 months after injury.

Page 288e.

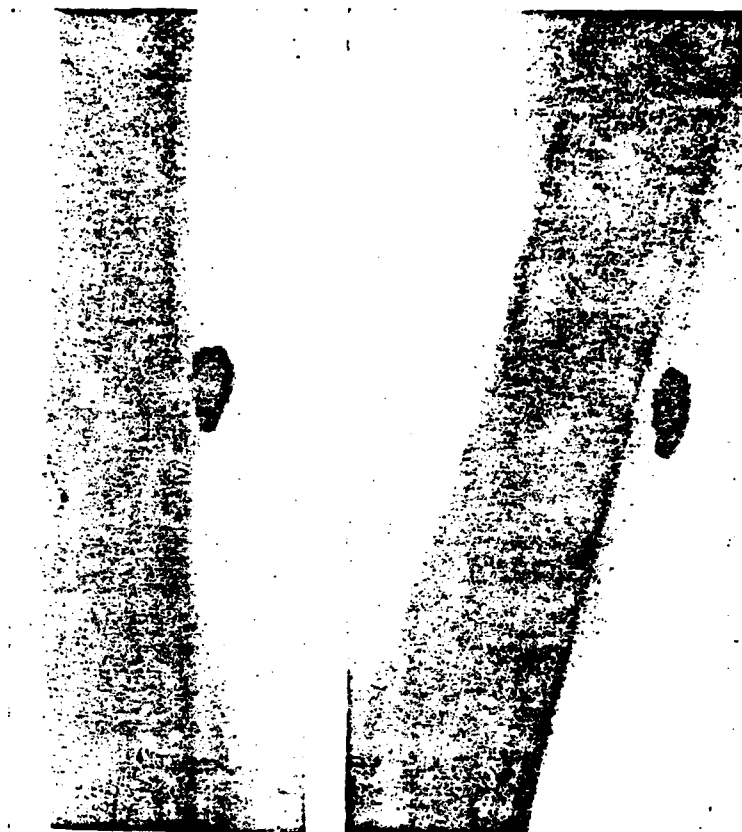


Fig. 39. P., 32 years. After the injury of left thigh. Is discovered metallic fragment and small edge/boundary defect of the cortical layer of femoral bone.

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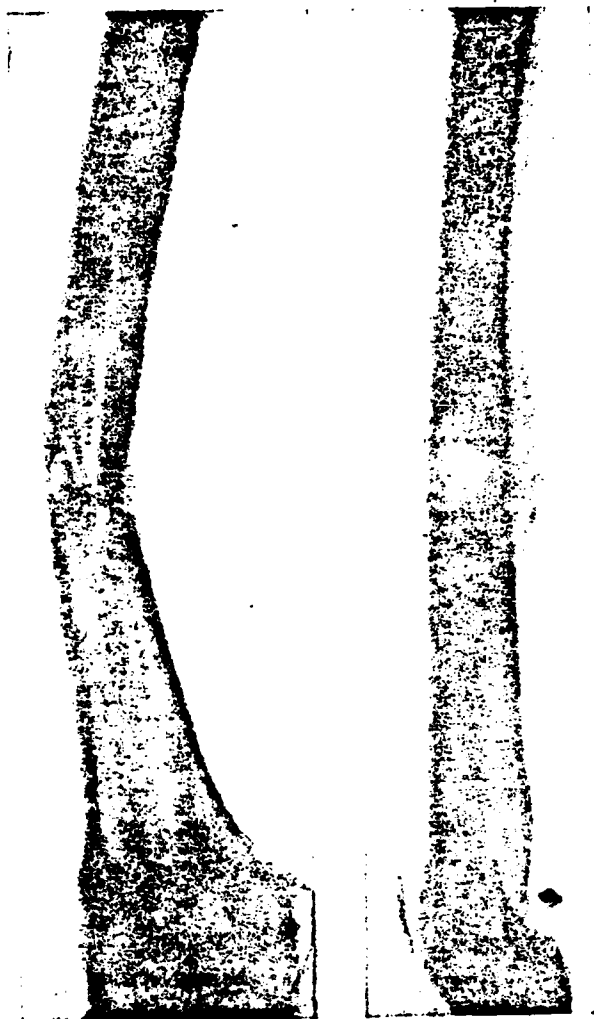


Fig. 40. The same injured person. 7 Weeks after injury.
Osteomyelitis, pathologic fracture.

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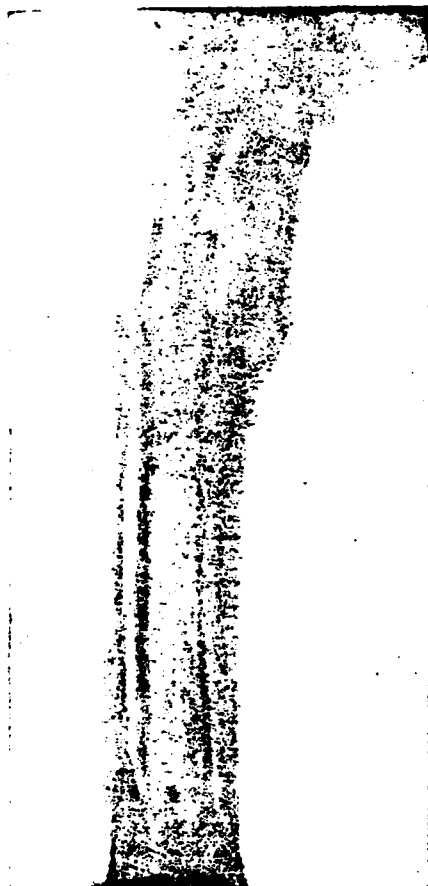


Fig. 41.



Fig. 42.

Fig. 41. K., 19 years. 6 months after injury. In upper and middle third of left femoral bone for the elongation/extent 19 cm central necrotic section.

Fig. 42. Ya., 24 years. In the X-ray photograph of left thigh of 4/VIII 1945 is a central necrotic section with the rounded ends.

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This form, which is observed with the the hematogenic osteomyelitis in children, it was encountered with the full/total/complete bullet break of thigh and most frequently in the average/mean division of diaphysis.

Clinically it flowed/occurred/lasted in the majority of injured people subacute or chronically without the violent symptoms, insidious sharpening the forces of injured person, and without surgical intervention it led usually to the death.

The essence of this form consisted in the longitudinal splitting/fission of the cylinder of cortical substance on the external ones, little changed, only slightly rarefied layer and internal necrotic. Simultaneously perished porous substance of bone and bone marrow. Were obtained as two inserted into each other of cylinder - external, consisted of the living skin of cortical substance bones with the periosteal layerings, and internal, switched on internal dead layer of the cortical substance of bone and inflammatorily changed bone marrow which acquired a yellowish-green

color and malodorous odor. The length of central sequestration sometimes reached 20-25 cm.

The reason for the onset of this form of osteomyelitis could be the injury of the central feeding bone artery and the suppurative damage/defeat of bone marrow.

Total central necrosis was observed in the hospital basis of front in 1945 in 3.90/o of injured people with osteomyelitis of thigh most frequently at the age of 18-25 years. M. N. Akhutin not without reason assumed that a known number of injured people with the total central necrosis did not reach the hospital basis of front as a result of the amputation of extremity or death even in the army region. Several observations of injured people with the total necrosis are made by D. G. Rokhlin, A. I. S~~i~~irts et al.

As an example of total central necrosis can serve the following observation.

K., 19 years 9/IX 1943 obtained the break of left thigh and the injury of sciatic nerve by the fragment of mine. After 18 hours is produced the primary processing of wounds on DMP. After 5 days the revision of wound. On the 12th day is superimposed gypsum bandage. In view of deterioration in the state 19/X is produced the

operation/process of sequestrectomy. Subsequently the state of injured gradual was improved also toward the end of December it began to walk on the crutches. For a period of the following months twice it was necessary to reveal suppurative flows. During March the state of injured person began to deteriorate: in the region of wound appeared the pains, was strengthened the liberation/excretion of pus, temperature rose to 38.4° . Investigation of the blood: Hb 57g/o, er. 3930000, \bar{L} . 12000; ROE of 50 mm an hour. In the X-ray photograph of 1/III 1944 (Fig. 41) are determined destructive osteomyelitic foci and sequestrations in proximal fragment. In upper and middle third of femoral bone for the elongation/extent 19 cm is determined the central necrotic section, in upper division of which is revealed/detected pathologic fracture. The central necrotic section of bone is sharply delimited from the surrounding bone tissue by demarcation line for entire elongation/extent. Laminated periosteum around the femoral bone with respect to the propagation of the osteomyelitic process.

30/III 1944 under the cerebrospinal anesthesia is produced the operation/process of the trepanation of bone for entire elongation/extent from the basis of large trochanter to lower third of thigh. Is removed entire long internal cylinder of the sequestrated cortical layer of bone together with included in it bone marrow. Cavity is rubbed through/wiped off by alcohol and liquid of

iodine, it is filled by streptocida. After operation/process the injured person began gradually to get well itself and 4/VII 1944 were discharged from hospital with the diagnosis: chronic bullet osteomyelitis of left thigh with the open fistula, resistive extensor contracture of left knee joint, damage of sciatic nerve.

Not always the boundaries of total central necrosis are strictly parallel, sometimes they are narrowed to the periphery and they are curved, as it takes place in the X-ray photograph (Fig. 42) of injured person Ya., 24 years, with the bullet break of left thigh.

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In injured person the part of the total central sequestration and his boundary they give the exclusively contrast shadow, characteristic to metallic bodies.

Operation/process consisted in the wide trepanation and the removal/distance of long tubular sequestration with the retention/preservation/maintaining of the continuity of cortical layer and periosteum, at least on one hand, for the subsequent regeneration of bone and for preventing of considerable shortening or formation of the dangling extremity, which sometimes was observed after cross resection for the large elongation/extent. In the heavy

cases of the total necrosis of thigh with the septic state of injured person it was necessary to resort to the amputation.

In the treatment of the bullet breaks of thigh and in the diagnosis of their complications, especially osteomyelitis, high value had x-ray examination. From this point of view are important the data of the development of the histories of disease/sickness/illness/malady about the first stage of evacuation, in which was produced this investigation. From a number of injured people with bullet osteomyelitis of thigh passed all stages without the x-ray examination only by 5.90/o. In remaining injured people the first x-ray examination was conducted in the following stages: DMP - 0.10/o, PPG - 5.80/o, AEG - 11.00/o, FEG - 41.20/o, back EG - 41.20/o, other - 0.70/o.

According to these data, within the limits of the army and army region were subjected to x-ray examination by 16.90/o of all injured people with bullet osteomyelitis of thigh, and if we to them add 41.20/o of subjects in the front region, then it will seem that after the "porta" of front it was evacuated by 58.10/o of injured people after X-ray analysis.

The periods of the establishment of the diagnosis of bullet osteomyelitis of thigh in the hospitals of front basis (for the

author) following: in the course of the first month the diagnosis of osteomyelitis was established/installed in 9.7o/o of injured people, in the course of the second month - in 21.2o/o and in the remaining injured people (69.1o/o) osteomyelitis was identified in the course of the third month.

The diagnosis of osteomyelitis, established/installed in the course of the first month, fell mainly to the latter/last decade/ten-day period. Here, naturally, entered predominantly the sharp/acute and subacute forms of osteomyelitis. The enumerated periods of the setting of diagnosis testify about the high value of the timely recognition of osteomyelitis.

Suppurative flows were the sufficiently frequent (6.0o/o) satellite of osteomyelitis of thigh, it is heavy to those reflecting in the state of injured people.

Initially suppurative accumulations coincided in form and sizes/dimensions with hematoma, and only subsequently they began to spread in essence on gravitational force in accordance with the topography of muscular partitions/septa (Vol. 15, pg. 333, 345, etc.) and they depended on the level of the break of thigh.

The recognition of flows on the thigh was not the lung as a

result of the powerful/thick development of muscular tissue; therefore they usually were detected, when they reached narrower than considerable sizes/dimensions. Especially frequently they retarded with the autopsy of the flows, which developed under the gypsum bandage.

The formation of the flow was accompanied by deterioration in the general state of the injured person: considerably was raised temperature, was noted the loss of sleep and appetite, appeared pains, frequently the chill and perspiration. Locally appeared edema, infiltration, were smoothed the folds of skin; during the palpation was determined sickliness. Frequently appeared swelling in the extremital divisions of extremity, at the rear stops and at the fingers/pins. In the presence of gypsum bandage local symptoms were hidden before surgeon's look; besides deterioration in the general state, remained the sometimes well expressed swelling of fingers/pins and sickliness during the palpation in the region of the increased inguinal glands.

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In the exhausted injured people as a result of the lowered/reduced reaction all symptoms of flows were unclear. In injured people with acute osteomyelitis the overall phenomena, which accompanied

suppurative flow, were laminated to heavy even without that general state and therefore happened to have expressed so/such distinctly as the injured people with favorable thus far course of osteomyelitis.

With the breaks of thigh in the upper third flows were arranged/located more frequently under the quadriceps muscle of thigh. Sometimes they reached very large sizes/dimensions and they were discharged along a vastus intermedius, to lower third of thigh. Another way of the formation of flows is passed to the group of the bringing muscles predominantly along a adductor minimus. thinner/less frequent with tightening breaks flows were spread upward, into the cavity of pelvis, along an iliac-lumbar muscle or downward, under the adductors. Sometimes flowed in, that was being spread upward under the adductors, it penetrated under the large buttock muscle.

With the breaks in middle third of thigh the flows were arranged/located predominantly along the medial surface, it is more frequent under the large adductor. This is one of the frequent localizations of flows. Greatly rarely it was necessary to reveal the flows, arranged/located over the external surface of thigh. It is necessary to assume that the supplementary sections/cuts, which were being conducted frequently over the external surface of thigh, during the primary surgical processing impeded the formation of flows in the lateral region. The flows, which were being arranged/located in the

region of the leading muscles, could penetrate in vagina m semimembranosi and m m semitendinosi, and especially with skeletal stretching, they flowed in view of severity to the sciatic mound.

With the breaks of thigh in the lower third flows most frequently were spread into the popliteal pit.

The knowledge of topography (Vol. 15, pg. 345) and ways of the propagation of suppurative flows facilitated their recognition. With the autopsy one ought not to have considered the position of injured person on the bed, that was being added to it for the purpose of the emptying of pus (law of severity).

To the success of fight with the flows much contributed works dedicated to this question, A. N. Maksimenkova, V. P. Voyno-Yasenetskiy A. T. Lidskogo et al.

Treatment.

Basic principles of treatment. By the correct treatment of bullet osteomyelitis of thigh was considered active- surgical and as the leading method - operational intervention. This installation was universally recognized and confirmed by the experiment/experience of war. However, the ways of prophylaxis of bullet osteomyelitis, the

periods of the realization of operation/process in the presence of bullet osteomyelitis, its volume and methods of the subsequent treatment (gypsum bandage or stretching) served during the war as the object of the lively and sometimes sharp/acute discussions. Discussions vividly reflected the results of the scientific searching of the best ways of treatment of one of most serious complications of so heavy an injury as the bullet break of thigh. It is very valuable, that, together with the surgeons, to which in this belonged the leading role, active part into search of the best methods of treatment took roentgenologists, anatomical pathologists and biochemists. It would be by the error underestimate the value of the participation in the resolution of this problem and the therapeutists, who helped with the study of the general/common/total reaction of organism to bullet osteomyelitis, in the setting of the diagnosis of associated complications from the side of internal organs/controls and in the mobilization of the forces of the organism of injured person for overcoming of these complications.

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The Great Patriotic War the surgeons entered armed mainly by the experiment/experience of the treatment of hematogenic osteomyelitis. The principles of the treatment of bullet osteomyelitis of thigh according to the experiment/experience of the first world war it

little differed from the principles of the treatment of chronic hematogenic osteomyelitis. At that time the surgical treatment of bullet osteomyelitis they began only during the remission/abatement of the inflammatory process when began already the intergrowth of break and ended with sequestration (A. D. Ozerov, K. Franz, Boshler, etc.). The experiment/experience of the Great Patriotic War soon showed the groundlessness of these installations. Therefore the suppressing number of works on the theme about bullet osteomyelitis of the first years of war began with the contrast of hematogenic osteomyelitis to bullet and with the emphasis of the special features/peculiarities of the latter, that dictate another procedure of treatment. Already for a period of the first two years of war surgical interventions became more radical were conducted within the earlier periods.

S. A. Novotel'nov in 1942 at the conference of the surgeons in Samarkand supported the need for operation/process after the intergrowth of break upon determined after x-ray examination sequester and appearance of a fistula.

In the relation to evolution of installations is very characteristic the comparison of the resolutions of the 1st plenum of hospital council, which occurred in the beginning of 1942, and the 2nd plenum, which was taking place in 8 months, at the end of

December of 1942.

At the 1st plenum radical surgical intervention was recommended to produce 2-3 months after injury, if within this time inflammatory process in the place of break was not eliminated.

At the 2nd plenum it was indicated the need to extensively use more active surgical intervention and besides within the earlier periods. For chronic osteomyelitis the operation/process was recommended in time from 1 1/2 to 3 months from the moment/torque of injury.

Latter/last recommendations were accepted by the overwhelming majority of the surgeons. Operation/process of bullet osteomyelitis in the sharp/acute stage - great achievement of Soviet military field surgery. Overcoming the old traditions, which asserted danger of the disturbances/breakdowns of the integrity of wound barrier, was large progress, on what indicated V. F. Voyno-Yasavetskiy

The progress of military field surgery in the treatment of bullet osteomyelitis of thigh was expressed in development and use/application of a series/number of the operations/processes which were conducted in all stages of the course of osteomyelitis.

Operational methods.

In the sharp/acute and subacute stage they were applied: reworking, radical surgery necrosequenectomy, or as it is otherwise called, bloody reposition. In the chronic stage of osteomyelitis they were conducted sequenectomy and as radical intervention necrosequenectomy, moreover the procedure of operation/process was changed depending on that, when it was conducted: to the consolidation or already in the presence of the callus, and also depending on the correct or incorrect intergrowth of scrap.

Finally, one should mention about the operation/process of subperiosteal cross resection of the diaphysis of thigh in the region of break, which was conducted not only with different stages of osteomyelitis, but also during primary processing for the purpose of prophylaxis of complications.

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Reworking of the break of thigh with acute osteomyelitis consisted in the expansion of wound and the carving of all changed soft tissues and granulations to the bone wound. Target of operation/process - to ensure a good outflow of pus thereby to decrease the intoxication. Therefore with the perforating injuries

they were conducted carving of both wounds, and with the blind-end injuries additionally was created contra-aperture. After carving the wounds had to have a somewhat expanding towards the outside belled form. In the region of bone wound were driven out available free bone fragments and foreign bodies. Operation/process was finished by setting of scrap and with the application of anechoic hip gypsum dressing.

The radical surgery of necrosequenectomy with acute osteomyelitis consisted of the carving of all painfully changed soft tissues and the removal/distance of the entire necrotized bone both become numb fragments and affected ends of the basic scrap of femoral bone. It is simultaneously very important it was important to remove foreign bodies. In conclusion was provided a good outflow, was conducted the reposition of scrap and it was laid anechoic hip gypsum bandage or skeletal/skeleton stretching. Some authors, underscoring the value of setting of scrap, called this operation/process bloody setting.

The operation/process of sequenectomy was conducted, as a rule, with the chronic bullet osteomyelitis and it consisted in the removal/distance of the already formed sequestrations.

The radical surgery of necrosequenectomy with chronic

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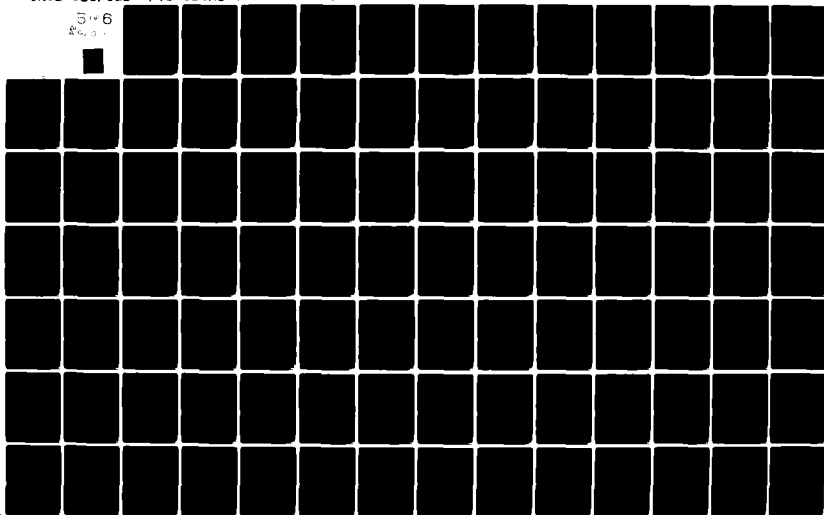
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osteomyelitis of thigh with absence of the intergrowth of break virtually in no way differed by nature (content) and tasks from a similar operation/process with acute osteomyelitis. Within the later periods, in the presence of consolidation, this operation/process had its special features/peculiarities. It was necessary to cut all over fistula channels and extensive cicatricial masses for the best mobilization of the surrounding muscles and skin. Were driven out dead fragments, sequestrations and foreign bodies, which lie out of the callus. For the removal/distance of the sequestrations, insured in the thickness of the callus, was conducted its trepanation. Polythalamous, so-called hollow, callus transformed into the monothalamous U-shaped or keel-shaped cavity. The formed in the bone defect was filled with the seal of different composition - of muscles or skin, most frequently it remained under the blood clot.

In the presence of faulty intergrowth some authors produced simultaneous osteotomy, another put off the correction of strain to the second stage when osteomyelitis has already been eliminated.

Finally, should be mentioned scraping of bone cavity by sharp/acute spoon, i.e., the operation/process "curettage," which had wide distribution in the beginning of war, but subsequently by all of that condemned and left as conducted "blindly" and rarely led to the target.

Readings to surgical intervention and its period with the sharp/acute and chronic form of osteomyelitis of thigh were established/installed different.

With the sharp/acute form of osteomyelitis of thigh with the expressed intoxication all surgeons unanimously were inclined to the need for urgent operation. Was discussed only a question about the volume of this intervention: to be restricted only to the wide disclosure/expansion of the place of the break for the liquidation of the heavy state of injured person and the radical surgery of necrosequesrectomy to produce subsequently, when all necrotic sections of bone are well delimited, or instead of the two-stage operation immediately produce radical surgery.

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The supporters of two-stage method (A. T. Lidskiy, V. D. Anchelevich, K. I. Mishin, M. S. Rutshteyn, L. S. Khavkin et al.) saw his advantage in a small volume of first intervention, which was being usually more easily transferred by injured people, who were being located into the more or less heavy state. Furthermore, during the second operation/process already better was designated the difference

of the honey of living and dead bone, which made it possible to make an operation/process more radically.

In the beginning of the second half war surgeons' majority agreed with this opinion. Ya. M. Bruskin was the convinced supporter of the one-time radical operation of osteomyelitis.

In the satisfactory state of injured person it recommended is performed the radical surgery of necrosequestreotomy in the general heavy state of injured person - to without delay employ an operation/process of the type of late processing or to resort sometimes to the amputation.

Fervently maintained the surgical treatment of osteomyelitis within the earlier periods and therapeutists, considering that by these it is possible to avoid flare-ups of the silent in the organism infection and onset of nephritis, hepatitis and pneumonia (M. Ya. Ar'yev).

Therefore many surgeons were inclined in the sharp/acute phase of osteomyelitis and the general satisfactory state of injured person to the realization of the operation/process of radical necrosequestreotomy which differed from reworking by the fact that not only were driven out the free bone fragments and foreign bodies,

but also additionally were treated the ends of the basic scrap.

The operation/process of radical necrosequestreotomy with the retention/preservation/maintaining of the part of the bone fragments, connected with the periosteum and of the generating the bridge between the refreshed ends basic breakings, differed from the operation/process of subperiosteal cross resection: with the latter are driven out all without the exception/elimination bone fragments, both free, and connected with the periosteum, and only periosteal cover connects the refreshed ends of the basic scrap.

Toward the end of the war in the relation to the character/nature of operation/process apropos of osteomyelitis in the sharp/acute phase the extreme points of view were drawn together: the supporters of radicalism (Ya. M. Bruskin) recognized as that permitted apropos of osteomyelitis to produce subperiosteal cross resection only during the specific readings, and supporters of the operation only of the wide disclosure/expansion of focus began to connect up operation/process on the soft tissues and the removal/distance of dead bone fragments (M. O. Fridland, A. T. Lidskiy), and processing the ends of the basic fragments (P. G. Kornev). The reflection of this understanding it was resolution of the expanded conference on bullet osteomyelitis, called during May 1944 in Vologda.

In the first point of resolution it is discussed the fact that in the sharp/acute stage of bullet osteomyelitis in the satisfactory state of injured person is conducted the immediate operation/process. It consists in removal of bone fragments, refreshment of basic fragments from the become numb sections to the first signs of the appearance of a layer of the bleeding bone. Processing soft tissues - according to the general/common/total rules, the safeguard of an outflow, immobilization. In the heavy state of injured person the operation/process is limited only to the disclosure/expansion of suppurative focus, if necessary is conducted the amputation.

As the example to surgeons' increased activity can serve materials of one of the distributing evacuation points, represented in Table 194.

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The results of the increased surgical activity in the relation to bullet osteomyelitis of thigh can be illustrated by materials of one of the evacuation hospitals of the same REP, represented I. M. Levintov (Table 195).

Lethality in the same hospital in 1943 was lowered 2 1/2 times in comparison with 1942, and in 1944 - 10 times.

The decrease of a quantity of amputations, secondary hemorrhage and a reduction in the lethality on hospital of one of REP depended on an improvement in the work of the preceding/previous stages, in connection with which changed the contingent of the injured people, who entered into this hospital into 1943 and 1944, and from the increased surgical activity in the system of hospitals of this REP.

Are analogous the materials of A. S. Khavkin, who worked in the evacuation hospital of the nearest rear.

surgical activity not only sharply lowered the number of amputations and lethality, but also shortened the duration of treatment. Of this it was possible to be convinced during the comparison of the activity of two evacuation hospitals of system REP with the identical contingent of injured people. In one hospital strictly was conducted earlier radical intervention, the secondly they continued to remain on the positions of expectant treatment, very with restraint relating to the early and radical operation.

In the first hospital the injured people with the bullet break of thigh were treated on the average of 180 days, were discharged by convalescents 17.10/o, and in the second hospital injured people were treated 236 days, it was discharged by 16.60/o.

Table 194. Distribution of operations/processes apropos of osteomyelitis of thigh in the system of evacuation hospitals of one of the distributing evacuation points during two periods of war (according to G. Ya. Iosset) (in the percentages).

(1) Название операции	(2) Первый период (1941)	(3) Второй период (1942-1944)
(4) Разрез мягких тканей	64,0	14,0
(5) Удаление свободных осколков и секвестров	18,0	60,0
(6) Резекция кости	0	14,0
(7) Ампутация	18,0	12,0
(8) Итого	100,0	100,0

Key: (1). Name of operation/process. (2). First period. (3). Second period. (4). Section of soft tissues. (5). Removal/distance of free fragments and sequestrations. (6). Resection of bone. (7). Amputation. (8). Altogether.

Table 195. Frequency of amputations and secondary hemorrhages the injured people have with bullet osteomyelitis of thigh during the different years of war in one of the hospitals of distributing evacuation point (according to I. M. Levintov) (in the percentages).

	(1) Годы		
	1942	1943	1944 (I I-IV)
(2) Ампутации	28,0	5,3	2,6
(3) Вторичные кровотечения	5,6	0,1	0,2

Key: (1) . Years. (2) . Amputations. (3) . Secondary hemorrhages.

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Consequently earlier and radical surgical intervention considerably shortened the duration of treatment - almost by 2 months, moreover in the quality of issues this was not reflected negatively.

The examples indicated were the particular reflection of the general/common/total installations of the military medical service. About this convincingly tell the data of the development of the histories of diseases/sicknesses/illnesses/maladies, given in Table 196. They vividly demonstrate as on the years of the war sharply reduced a quantity of injured people with bullet osteomyelitis,

treated only conservatively or by operations/processes on the soft tissues and as was respectively increased a quantity of radical surgery on the bones.

An increase of the number of conservatively treated injured people in 1945 is explained by earlier extraction from the hospitals (on our own wish) in connection with the termination of war.

The principle of the removal/distance of the affected bone with osteomyelitis found its justification in the obtained results. It is doubtless, operations/processes on the bone were employed in heaviest injured people, and nevertheless, as can be seen from data of the development of the histories of disease/sickness/illness/malady (Table 197), the percentage of the recovery of osteomyelitis with these operations/processes proved to be greatest.

In Table 197 is reflected the perfection of the treatment of injured people with osteomyelitis of the femur using all methods, but not only on the operations/processes on the bone, since from years of war a number of those cured during the use/application of any method was increased.

Table 196. Methods of the treatment of bullet osteomyelitis of thigh into the different genera of war (in the percentages).

(6) Годы	(1) Метод лечения				(5) Всего
	(2) Только консервативный	(3) Операция только на мягких тканях	(4) Операция на кости		
1941	23,4	34,2	42,4		100,0
1942	21,9	21,0	57,1		100,0
1943	14,8	13,5	71,7		100,0
1944	7,2	14,7	78,1		100,0
1945	17,5	12,5	70,0		100,0
(7) В среднем . . .	15,4	16,9	67,7		100,0

Key: (1). Method of treatment. (2). Only conservative. (3). Operation/process only on soft tissues. (4). Operation/process on bone. (5). In all. (6). Years. (7). On the average.

Table 197. Frequency of the recovery of bullet osteomyelitis of thigh in connection with the method of treatment during the different years of war (in the percentages).

(1) Метод лечения	(2) Годы					(3) В среднем
	1941	1942	1943	1944	1945	
(4) Только консервативный	42,3	38,5	48,5	56,6	51,4	46,2
(5) Операция только на мягких тканях	37,0	42,5	54,8	65,0	38,0	50,0
(6) Операция на кости	44,7	47,9	48,6	58,3	74,5	54,6
(7) В среднем	41,4	44,7	49,3	59,1	65,6	52,3

Key: (1). Method of treatment. (2). Years. (3). On the average. (4). Only conservative. (5). Operation/process only on soft tissues. (6). Operation/process on bone. (7). On the average.

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A smaller number cured during the use/application of conservative treatment or operations/processes on the soft tissues in 1945 in comparison with 1944 is explained by the earlier extraction of injured people from the hospital in connection with the termination of war. There is no doubt that the part of such early discharged injured people on the arrival to the native land got better without further operations/processes. If war was continued, such injured people they did not discharge, and their recovery would begin in the hospital.

It is very important to note that all three methods of treatment were applied approximately/exemplarily in the identical percentage relationships/ratios with different type breaks (Table 198).

There is no doubt that during the different years of war the combinations of the methods of the treatment of osteomyelitis of thigh with each of these forms/species of break were different and they repeated on the whole of the laws, noted in Table 196.

With chronic osteomyelitis of the thigh of reading to the operation/process and its periods within the time of war also changed. In the beginning of war the overwhelming majority of the surgeons adhered to expectant tactics. But the prolonged periods of duration frequently led to the severe complications for the injured people, and this impelled surgeons to switch over to early intervention. To tendency to shorten the periods of the duration contributed also the difficulties, which expected surgeon with the operation/process of chronic osteomyelitis of thigh with the large sclerosed polythalamous corn with the immured in it sequestrations. In connection with the technical difficulties of the removal/distance of entire necrotic bone the results of operation frequently proved to be defective that was caused the need for repeated intervention.

Operation/process apropos of chronic bullet osteomyelitis of thigh within the earlier periods did not in any way remove the need subsequently for the supplementary operations/processes milking of the removal/distance of the left and rastrike sequestrations.

However, surgical intervention with the even insufficient demarcation was frequently accompanied by the abandonment of the necrotized sections of bone, and sometimes excessive shortenings. Although the relapses flowed/occurred/lasted quietly and the removal/distance of separate forming of sequestrations did not present difficulties, nevertheless the need for repeated operations/processes distressed and wounded, and surgeon.

Table 198. Methods of the treatment of bullet osteomyelitis of thigh, which complicated the breaks of different type (in the percentages).

(1) Вид перелома, осложнившегося остеомиелитом	(2) Метод лечения	(3) Консер- вативный	(4) Операция только на мягких тканях	(5) Опера- ция на кости	(6) Всего
(7) Дырчатый и краевой		13,9	26,6	59,5	100,0
(8) Оскольчатый		15,9	15,9	68,2	100,0
(9) Раздробленный		12,5	19,8	67,7	100,0
(10) Прочие		15,1	19,1	65,8	100,0

Key: (1). Form/species of the break of that complicated by osteomyelitis. (2). Method of treatment. (3). Conservative. (4). Operation/process only on soft tissues. (5). Operation/process on bone. (6). In all. (7). Perforated and edge/boundary. (8). Fragmented. (9). Crushed. (10). Other.

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Meanwhile the more advanced processing of the breaks of thigh in the foremost stages of evacuation affected not only the decrease of an absolute number of injured people with bullet osteomyelitis, but also on its lighter course, that made it possible to again somewhat move aside the periods of intervention to the full/total/complete demarcation of bone necroses, i.e., before the appearance of sufficiently distinct boundaries for production in the radical and final surgery.

On the character/nature of all operations/processes, which were being conducted in injured people with bullet osteomyelitis of thigh, gives representation ~~f~~able 199 (data of the development of the histories of disease/sickness/illness/malady).

It is logical that the greatest number of removals/distances of bone fragments and foreign bodies, revisions of the wounds of workings of basic fragments and dressings of vessels was realized in the forward area - army and army. However, sequestrectomies in the overwhelming majority were conducted in the administrative area. If we do not consider primary surgical processing, then 15.40/o of injured people with osteomyelitis thighs did not undergo operations/processes completely, from the remaining injured people were operated on one time - 43.20/o, on 2 times - 32.80/o, on 3 times - 14.80/o, on 4-5 times - 8.10/o, on 6 times and more - 1.10/o.

Consequently, it is more than 3 times wasoperated only 9.20/o of injured people. On the average to one operated injured person complicated by osteomyelitis the bullet break of thigh were about two operations/processes (1.90/o). In the group of the injured people, who did not have osteomyelitis, it was not operated by 40.60/o, but from a number of those operated to one it was necessary for 1.6

operations/processes (on the average) .

Thus, with complication by osteomyelitis of the bullet breaks of thigh 3 times was almost decreased a number of injured people, who were not needing operation/process, and somewhat more frequently appeared need in the repeated operations/processes.

In the overwhelming majority of injured people with osteomyelitis of thigh (88.00/o) to sequestrectomy were conducted the operations/processes, among which somewhat less than 3/4 comprised primary surgical processing. With the course of war was decreased a number of injured people, by sequestrectomy those not undergoing operations/processes (table 200).

Table 199. Distribution of injured people with bullet osteomyelitis of thigh according to the regions in connection with the character/nature of the conducted in these regions operations/processes (in the percentages).

(1) Характер операции и его удельный вес	(2) Район	(3) Войсковой и армейский	(4) Фронт	(5) Тыловой	(6) Всего
(7) Ревизия раны (7,4%)		79,6	16,9	3,5	100,0
(8) Обработка основных фрагментов кости (5,6%)		42,1	36,4	21,5	100,0
(9) Удаление костных осколков и инородных тел (11,9%)		43,4	39,8	16,8	100,0
(10) Вскрытие гнойных затеков (11,0%)		33,5	41,2	25,3	100,0
(11) Ампутация (3,7%)		15,7	40,0	44,3	100,0
(12) Секвестрэктомия (53,2%)		1,9	16,0	82,1	100,0
(13) Перевязка сосудов (1,0%)		50,0	33,3	16,7	100,0
(14) Реампутация (0,3%)		—	—	100,0	100,0
(15) Прочие операции (5,9%)		6,7	45,2	48,1	100,0
(16) В среднем по всем операциям		20,1	25,1	54,8	100,0

Key: (1). Character/nature of operation/process and its specific gravity/weight. (2). Region. (3). Army and army. (4). Front. (5). Back. (6). In all. (7). Revision of wound. (8). Processing basic fragments of bone. (9). Removal/distance of bone fragments and foreign bodies. (10). Autopsy of suppurative flows. (11). Amputation. (12). Sequestrectomy. (13). Dressing of vessels. (14). Re-amputation. (15). Other operations/processes. (16). On the average on all operations/processes.

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An increase in the number of operations/processes, which were being conducted to first sequestrectomy, occurred mainly due to more frequent production in the primary surgical processing/treatment (on the years of war), which decreased the necessity for other operations/processes.

Together with the realization of operation/process for bone and its radicality, in the recovery of bullet osteomyelitis vital importance had the factor of time - period of operation/process. The advisability of early operation/process is confirmed by data of the development of the histories of the disease/sickness/illness/malady: with sequestrectomy (or resection) in the course of the first month after injury osteomyelitis was cured in 60.60/o of injured people, with the operation/process, produced in the course of the second month, in 60.40/o, the third month - in 54.00/o, the fourth - in 51.00/o, the fifth - in 43.80/o and after 6 months and more - in 39.00/o.

Anesthetization. The considerable volume of surgical

intervention with the operations/processes apropos of osteomyelitis on the thigh, and also the impossibility in the majority of injured people to predetermine the boundaries of predicted intervention served as the reason for the production of the overwhelming majority of these operations/processes under narcosis. A. V. Melnikov correctly considered that intervention on the thigh relates to the operations/processes of very large scale and therefore must be conducted only under the general/common/total anesthetization.

On the different authors, anesthesia/narcosis was applied in 88.6-92.7o/o of injured people with osteomyelitis of the thigh (in this case most frequently was given ether/ester), cerebrospinal anesthesia - in 2.0-12.0o/o and local anesthesia - in 3.9-9.4o/o; some surgeons the majority of operations/processes produced under the local anesthesia (Ya. M. Bruskin).

Exsanguination of operating field. Bloodless operation considerably facilitated surgeon alignment in the tissues of operating wound. This was especially importantly with the operations/proccasses apropos of osteomyelitis, with which it is necessary to differ living tissue from the corpse and to drive out the latter, since the relapses of osteomyelitis, to a considerable degree depended on the insufficient radicality of operation/process.

Operation under the tourniquet also considerably decreased the blood loss, which was especially important for the exhausted and anemic injured people.

Table 200. Operations/processes, which preceded first sequestrectomy (or resection) a propos of bullet osteomyelitis of thigh during the different years of war (in the percentages).

(1) Годы	(2) Характер операции	(3) Только первичная хирургиче- ская обработка	(4) Другие операции	(5) Первичная хирургиче- ская обра- ботка и дру- гие операции	(6) До севе- стрэктоми операций не произво- дилось	(7) Всего
1941		43,0	14,2	24,5	18,3	100,0
1942		46,0	7,2	24,5	22,3	100,0
1943		56,0	5,7	26,0	12,3	100,0
1944		61,5	3,3	27,5	7,7	100,0
1945		62,5	2,0	32,0	3,5	100,0
(8) В среднем . . .		55,9	5,2	26,9	12,0	100,0

Key: (1). Years
(2). Character/nature of operation/process. (3). Only primary surgical processing/treatment. (4). Other operations/processes. (5). Primary surgical processing/treatment and other operations/processes. (6). To sequestrectomy of operations/processes it was not conducted. (7). In all. (8). On the average.

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Individual surgeons retorted to the use/application of a tourniquet (A. V. Melnikov, V. D. Anchalevich) due to the fear to sharpen suppurative process, also, to avoid secondary hemorrhages and traumatization of tissues; however, they did not give direct indications of the harm, which was causing itself by tourniquet.

Operational accesses. For the realization of operations/processes apropos of osteomyelitis for thigh necessary the section/cut of sufficient sizes/dimensions in order to have the capability to inspect well entire zone of the breaking up of the femoral bone whose extent varied, according to anatomical pathologist A. V. Smol'yannikov's data, in the limits of 13-15 cm, and according

to the data of surgeons (Ya. M. Bruskin, M. I. Kuslik), 8-12 cm. Thus, the extent of the breaking up of the diaphysis of thigh had small oscillations; with an increase in the kinetic energy of projectile is increased only the degree of the crushing of bone [A. V. Smol'yannikov, Fessler]. In the determination of the necessary length of section/cut and, which is still more important, arrangement its great assistance is exerted the careful study of the X-ray photographs, produced not less than in two projections. This made it possible to distinctly present the character/nature of the break, the arrangement of foreign bodies and the abundance of the pyonecrotic and reparative processes in the bone. Taking into account the favorable value of the smooth assimilated periosteum, which covers the calm sections of bone, it was to be, naturally, attempted to carry out access through the zone of fringed periosteum. This way rather led to the center of focus and it proved to be that most sparing with respect to the healthy/sound bone.

Essential aid in the development of the ways, which facilitate access to the focus of infection, rendered fistulography, that indicates the course of fistula and the arrangement of the central focus of infection (G. A. Zedgenidze).

During the determination of way through the soft tissues were considered three conditions: 1) the arrangement of basic

neurovascular shaft, 2) care of usually narrower considerable of injured/damaged muscular tissue even 3) the safeguard of a good outflow. Latter/last condition lost its value with the operation/process apropos of chronic osteomyelitis, which gives the possibility to sew wound tightly.

These requirements to the known degree satisfied access by the progressive expansion of the already available wound or fistulas. This access is advantageous also because of the fact that incidentally it was possible to remove scar tissues and fistulas. A. V. Melnikov considered best the S-shaped section/cut in center of which was arranged/located the fistula. Simultaneously it insisted on the carving of entire scar tissue.

Very frequently, especially, where it was necessary to drain well wound, access to the bone was opened/disclosed from two sides. Sometimes the topography of bone wound or the arrangement of foreign bodies they indicated the need for approach from the side of the healthy/sound sections of soft tissues. For this purpose the author together with N. V. Proskuryakova in 1943 developed the operational accesses with osteomyelitis of different localization. For the exposure of femoral bone more frequently was realized the external access in the gap/interval between m vastus lateralis and m biceps femoris.

With the front/leading access whose projection lies/rests on the straight line, which connects a upper-front/leading awn of iliac bone at by the internal edge of stifle, the straight/direct muscle of thigh was abstracted/removed towards the inside, and then they penetrated in the gap/interval between m vastus lateralis and m vastus intermedius; in this case was uncovered entire/all front face of middle and lower third of diaphysis.

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The overwhelming majority of the surgeons focused attention on that so that the section/cut would be sufficient, but not excessive: one ought not to have excess separated/liberated periosteum from the bone and especially periosteum from its feeding soft tissues; one should have separated/liberated periosteum from the bone with the aid of sharp/acute rasp or chisel for retaining/preserving/maintaining its cambium layer. For the safeguard of a good outflow widely was opened the place of break and bit the ends of the basic scrap, especially as they were gloomy to sequestration.

With the operation/process in the stage of acute bullet osteomyelitis of the thigh when the line of the demarcation of

necrosis is not yet expressed, to surgeon it was difficultly distinguish the sections of dead bone of the living. The color of bone, its hardness, hemophilia, which was becoming apparent under the tourniquet in the form of the sweating of the droplets of the blood on the surface, and finally smaller degree of the staining of healthy/sound bone with the solution of Rivanol helped to distinguish it of the lifeless white, brittle, lack of blood flow, and more intense than stained with Rivanol dead bone.

During the removal/distance of the affected ends of the basic scrap the surgeons put to use the forceps of Luer and Liston. In order to decrease the harmful effect of these instruments (onset of longitudinal cracks on which is spread suppurative process), was recommended to sharply sharpen them and during fragment removal to seize the gradually small sections of bone. Is least traumatic the sawing of the ends of the basic scrap by the saw of Gigli or Olivecron. In this case all authors cautioned from the use/application of a rough method of the dislocation of the ends of the basic scrap from the wound.

With chronic osteomyelitis of thigh with the presence of a duplistic corn with the immured in it sequestrations were revealed the cavities and were driven out dead sections of bone, sequestrations and granulations by the U-shaped chisels of different

sizes/dimensions and by sharp/acute spoon. In this case attempted to preserve to sufficient strength the bridge between the basic scrap of femoral bone, i.e., to ensure continuity the bones and thus to avoid the possibility of break and subsequent displacement of scrap.

In the chronic stage of osteomyelitis the necrotized sections of bone were either already completely isolated or from the planned by line demarcation. Secured sequestrations it should have been with the smallest traumatization, swinging by their fingers/pins, sequestal by forceps or by chisel accurately along the line of demarcation. With the insufficiently expressed boundary of necrosis the affected sections were driven out in the limits of healthy/sound bone.

Together with the removal/distance of free dead fragments, high value had a removal/distance of foreign bodies - the fragments of the wounding projectiles, pieces of clothing, etc. At the termination of operation/process Raus abundantly washed from Esmarkhov circles in the strong stream of warm physiological solution. Procedure this, recommended by R. R. Vreden as far back as of Russo-Japanese war (1904-1905), was sufficiently widely disseminated, also, during the Great Patriotic War. Some surgeons put to use for the washing with the solution of Rivanol (1:1000) and with the soap solution (P. G. Kornev, N. N. Samarin, A. V. Melnikov et al.).

The important stage of operation/process was the guidance of scrap, which was realized with the aid of the extracting apparatuses with simultaneous guidance of the scrap through the wound.

For the retention of scrap some surgeons used catgut sutures or put to use the forceps of Lambotte to the solidification of gypsum.

Especially useful for the retention of scrap was the well modeled gypsum bandage.

The surgical processing/treatment of wound and its washing were supplemented by the use/application of different antiseptic substances - alcohol, iodine, chloramine, iodoform, etc.

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On the investigations by A. M. Morozenko, radical processing/treatment of osteomyelitic focus and subsequent rubbing of wound of 70° by alcohol gave only the quantitative decrease of microflora, true, considerable. The full/total/complete sterilization of wound is established/installed in separate injured people; therefore one ought not to have recognized as that as completely

shown after processing/treatment the overall and local use/application of sulfanilamide preparations. Surgeons' majority powdered wound by the powder of streptocide or sulfidine or it lubricated by 5.0-10.0o/o emulsion or ointment from sulfanilamide preparations. Were applied also other substances. Thus, P. G. Kornav used an iodoform-vaseline paste, M. O. Friedland - 5.0o/o ointment of clove oil with the olive oil, I. B. Kolodner - zinc peroxide. Widest use during the war received Vlasnyovskiy's oil-balsam emulsion.

After the operation/process, produced apropos of acute osteomyelitis, the safeguard of a good outflow in essence was achieved by imparting the corresponding form and arrangement to the gaping wounds. With the abundance of soft tissues sometimes was observed the premature joining of the edges of wounds before the liquidation of bone process. Therefore some surgeons introduced thick rubber drainages up to the bone defect. N. A. Ilinskiy conducted the through drainage through the section of the break into the contra-aperture on the posterior surface of thigh and immersed it in the infundibulum, gypsumed into the bandage. By this he attempted to prevent the accumulation of pus in the gypsum bandage and the maceration of skin. It should be noted that conducting drainage through the region of break did not meet support among the surgeons. G. Ya. Iosset it inserted for the safeguard of a hiatus of wound on the thigh drainage-spacer (concluded in the form of baranka

catheter) and it fixed/recorded with its several sutures to the walls of wound. For the same target harmed the muscles of the edges of operating wound to the surrounding skin.

After operation/process apropos of chronic osteomyelitis on the thigh surgeons' majority left the operating wound open.

However, during the known readings was allowed/assumed suturing of wound. Thus, A. T. Leeds and V. D. Chaklin considered it possible to close wound with rare sutures in those injured people whose suppuration earlier was moderate, and bone defect it was possible to fill with soft tissues. But if sharp/acute period previously flowed/occurred/lasted heavily and long, and also it was not confidence in the radical removal/distance of all necrotic tissues, then V. D. Chaklin left the wound open, allowing/assuming its only certain narrowing from the edges by one or two sutures. Ya. M. Bruskin after radical surgery apropos of osteomyelitis of thigh tightly sewed wound. Under the anechoic gypsum bandage in the majority of such injured people of wound they healed by primary tension, but through 2-3 weeks in them frequently was saved/accumulated pus, which was being revealed independently or after section/cut. Therefore subsequently it changed to the imposition on the soft tissues, including on the skin, only rare sutures.

A. V. Melnikov considered it necessary to saw wounds by tightly pillowed sutures, immersing graft/flap in the defect of bone; in this case in 60.0-70.0o/o of injured people it was observed primary healing.

Similar observations are made by other surgeons (by D. K. Yazykov, B. V. Khondrikov, N. Ya. Deyneka, Z. Ya. Rabkin, A. I. Sirts), who obtained good results in 46.0-75.0o/o of injured people.

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Under conditions for the strained work of vicinal evacuation hospitals more advisable, however, it was considered it during the smooth post-operation course to lay the deferred sutures on the 7-10th day through the cut out in the gypsum bandage window. During the correct selection of readings for the primary and deferred suture nevertheless approximately only in the half injured people occurred primary healing, moreover subsequently in the region of scar frequently were opened/disclosed fistulas. Nevertheless all this did not diminish the advisability of stitching during the correct selection of injured people.

The especially good results of the treatment of bullet osteomyelitis were obtained by M. N. Yelanskiy with the following procedure of operation/process: was driven out under the bone entire affected by suppuration bone and sequestrations; to the remaining healthy/sound bone (and to sequestral capsule) added as far as possible scarphoid form without deep cavities in the bone. Soft tissues and skin sewed by catgut tightly. Into the remaining bone cavity were introduced through the separate puncture of skin the thin catheter or the children's rubber catheter through which they set up to 7 days the permanent drop infusion of penicillin (in a 24 hour period 300-400 ml of the solution - 1000 MU of penicillin in 1 ml). In the majority of injured people was noted the primary adhesion.

Conservative methods.

These methods of treatment were applied mainly in combination with the surgical treatment, and in 15.40/o of injured people with osteomyelitis of thigh and independently.

In the Great Patriotic War gypsum bandage played extremely large role in prophylaxis and treatment of bullet osteomyelitis. Together with its medicinal effect in the fight with the infection, because of the creation of maximum after confessing to the adsorptivity of gypsum, to wide distribution of gypsum bandage contributed also

convenience in the evacuation of injured people and portability of their in the refuge with the air alert.

Usually the application of gypsum dressing preceded surgical intervention apropos of osteomyelitis; therefore most convenient were such tables on which it was possible and to operate, and to lay gypsum bandage. As has already been indicated, one of the critical stages of operation/process apropos of bullet osteomyelitis of thigh was the guidance of basic scrap, which was being realized via stretching and their simultaneous guidance in the wound. The correct placement of scrap and their subsequent retention in the necessary position with the aid of the gypsum bandage managed better, the more precise was established/installed the peripheral scrap of thigh with respect to the axis of central. For executing this rule was necessary with the breaks in upper and middle third of thigh to add extremity considerable removal/diversion, in order to prevent the formation of strain in the form "riding breeches", and with the breaks in lower third of thigh - considerable flexure in the knee and, consequently, also in the hip joint. This interrelation of flexure in the hip and knee joint escape/ensues from the rule, on which the posterior surface of gypsum bandage, which covers back and rump, must be in one horizontal plane with the heel, otherwise with the stacking of injured person to the panel gypsum bandage immediately crazes in the region of inguinal fold. Fixation of knee joint in the bent position

considerably facilitates the subsequent development of motions in this joint.

P. G. Kornev noted convenience in the application of hip gypsum dressing on the metallic rods of Diterichs in the position of injured person on the stomach.

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Taking into account the considerable liberation/excretion of pus with osteomyelitis, to the gypsum bandage they presented the series/number of requirements. Pus, which was being sucked in into the bandage, softened and weakened/attenuated it; therefore was necessary its increased strength. were proposed to make on the posterior (lower) surface of gypsum bandage at the level of thigh a series/number of small openings/apertures in diameter approximately 1 cm for the discharge of pus; by this to a considerable degree was prevented its accumulation in the bandage and maceration of skin.

Sketching by the black pencil of the configuration of wound on the gypsum bandage, laid with osteomyelitis, considerably facilitated the cutting out of window in it for the revision of wound, exchange of drainage, tampon, etc.

P. G. Kornev laid anacnoic gypsum bandage with the preformed window: casts and courses of bandage were placed on the edges of wound and only the latter/last courses of gypsum bandage occluded wound.

For the best desiccation wounds of V. S. Gelikonov and P. G. Kornev laid on it in the preformed window of bandage-cushions, filled with the mixture of the equal volumes of the ground charcoal and gypsum. This decreased a quantity of discharge, it deodorized and cleaned wound and safeguarded gypsum bandage from the soaking by pus.

Ye. V. Smirnov proposed a chlorine-gypsum bandage. The gypsum bandage before the application or dressing was immersed in the solution with the chlorinated lime (on 7 l of water 80 g of chlorinated lime), thanks to which the bandage acquired antiseptic properties and during the impregnation by pus did not issue unpleasant odor.

Skeletal/skeleton stretching with bullet osteomyelitis of thigh during the first 1 1/2-2 years of war in the front region and near rear was applied rarely, in the first place, according to sanitary-tactical conditions with the installation for the evacuation and, in the second place, as a result of few satisfactory results of treatment by stretching with acute bullet osteomyelitis.

During the first years of war in the treatment of bullet osteomyelitis the thighs predominantly put to use anechoic gypsum bandage. A. Yu. Manasevich during June 1942 in the report about the treatment of the bullet breaks of thigh according to the experiment/experience of the large/coarse evacuation hospital of rear noted that with the infected breaks the stretching did not provide the rest, necessary for the remission/abatement of inflammatory process, secondary hemorrhages were observed therefore many times more frequently, rather than in the gypsum bandage; the callus it was frequently also defective; therefore "in proportion to gaining of experience we resort to the stretching increasingly thinner/less frequent and it is thinner/less frequent", thus finished A. Yu. Manasevich his report.

The overwhelming majority of the surgeons with acute bullet osteomyelitis of thigh after the operation/process of secondary or radical processing/treatment conducted the treatment of injured people in the anechoic gypsum bandage and only during the remission/abatement of process, if there was a displacement, it converted/transferred to the skeletal/skeleton stretching.

Skeletal/skeleton stretching was laid more frequently with

moderately/mildly flowed/occurred/lasted restricted osteomyelitis in unexhausted injured people, when the considerable bias of scrap is present, not removed by one-time reposition on the extracting apparatus (A. T. Lidskiy, L. I. Saulutko, B. K. Babich, A. M. Naravtsevich, M. D. Michealson, V. N. Sokolov, M. I. Liubimov et al.).

The experiment/experience of back hospitals showed that the incorrect standing of scrap or thigh could be corrected by stretching, also, within the later periods - through 1 1/2-2, and sometimes also 3 months (Yu. Yu. Dzhanalidze, V. V. Gorinevskaya, F. R. Bogdanov, V. A. Chernavskiy, A. T. Lidskiy, Z. V. Bazilevskaya), but for this it was necessary to sometimes apply loads to 20-25 kg.

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Thus, were manufactured the following readings to the use/application of skeletal/skeleton stretching with bullet osteomyelitis of the thigh: the presence of the primary or relapsing/recidivism/recidivist/recidivity bias of scrap, nonremovable by one-time reposition and badly/poorly held by the gypsum bandage of the correct position of scrap during the subacute and chronic course of osteomyelitis.

Skeletal/skeleton stretching and gypsum bandage with the observance of correct readings did not compete, but they were the equally valuable and supplementing each other methods (V. D. Chaklin, B. M. Shkurov, S. I. Banaytis, B. P. Kirillov, M. R. Shapunov, M. I. Kuslik et al.).

While the appropriate readings and the correct conducting skeletal/skeleton stretching gave good results. V. D. Chaklin, Ya. M. Bruskin, F. R. Bogdanov, A. M. Naravtsevich, L. S. Khavkin et al. successfully applied skeletal/skeleton stretching after operation/process apropos of osteomyelitis of thigh.

For the imposition of skeletal/skeleton stretching with osteomyelitis of thigh all surgeons gave preference to the spoke which was conducted through tuberosity of the tibia for the purpose of going away as far as possible from the infected focus.

With the usual methods of skeletal/skeleton stretching it was not enough to achieve guidance, one ought not to have waited for known consolidation, since without this the subsequent gypsum bandage was not in any way guarantee from the secondary bias, especially if did not begin the cohesions/couplings of the ends of the scrap. According to L. S. Khavkin's data, the average duration of stretching with osteomyelitis of thigh was equal to 53.1 days, according to A.

M. Naravtsevichy - 45 days. M. I. Kuslik, L. I. Shulutko, V. G. Weinstein, M. R. Shapuncov, S. L. Firer et al. insisted so that the stretching would be continued not less than the month. In more detail about the use/application of skeletal/skeleton stretching during the treatment of the bullet breaks of thigh stated in volume 15 (pg. 429).

According to the data of the development of the histories of disease/sickness/illness/malady, the use/application of the therapeutic exercise, physiotherapy and medicinal/medicamentous treatment with bullet osteomyelitis of thigh is represented in the following form.

The therapeutic exercise, physiotherapy and medicinal/medicamentous treatment were applied in 61.40/o of injured people, therapeutic exercise and medicinal/medicamentous treatment - in 19.50/o, only therapeutic exercise - in 0.90/o, only medicinal/medicamentous - in 18.20/o.

The therapeutic exercise was applied in 81.80/o, physiotherapy - in 61.40/o of injured people with bullet osteomyelitis of thigh.

Therapeutic gymnastics in the hospitals of front basis, for author's data, began to apply after 10 days of injury in 0.60/o of

injured people, 15 days - in 4.40/o, 20 days - in 4.20/o, 25 days, in 8.00/o, 30 days in 82.80/o.

Thus, the methods of conservative therapy found the worthy place in the treatment of injured people bullet by osteomyelitis of thigh.

The given periods of the beginning of the use/application of the therapeutic exercise give grounds, however, to consider their somewhat late. The presence of gypsum bandage had to impede the realization of respiratory/breathing exercises and motions by free extremities, but the degree of physical load could be metered depending on the state of injured person.

Different to the form/species of physiotherapy in the hospitals of front basis were distributed as follows: massage - 32.10/o, irradiation by quartz it was electron-tube - by 20.40/o sollux -12.70/o, UHF - 9.80/o, paraffin - 8.70/o, peat - 7.40/o, water baths - 4.6 % diathermy - 4.3 %.

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X-ray therapy was realized for the therapeutic target after operation/process, and also for the diagnostic target for checking the strength of the recovery of osteomyelitis (M. P. Smirnov, D. G.

Rokhlin, M. I. Kuslik). Each performance consisted of the irradiation of one field whose sizes/dimensions varied in the limits 8x10 of cm and 10x15 cm, depending on the value of the affected section. Each of that treating obtained 1, 2 and 3 series. Series usually consisted of 5-6 performances with the gaps/intervals during 5 days. Dose to one field was equal from 40 to 60 g with a deep X-ray therapy (apparatus for a deep X-ray therapy with 145 kV, 4 A with filter 0.5 Cu+Al).

If necessary the repeated series of irradiation were conducted after interruption in 3-4 weeks. under the observation of the author the X-ray therapy was applied in 26 injured people with osteomyelitis of thigh, moreover in 16 of them was achieved/reached the stable recovery, checked by X-ray provocation. Together with the use/application of X-ray therapy, in the post-operation period for the liquidation of residual phenomena it sometimes had the independent value with the small cortical sequestrations after osteoperiostitis. In one injured person whose realization of operation/process impeded dermatitis, with the aid of the X-ray therapy was achieved/reached durable recovery. In the control X-ray photographs on the spot of the former process was determined only the periostitis, sequestration resolved.

It is appropriate to briefly stop at the treatment by pilgrim's anti-reticular cytotoxic serum (ATsS) with osteomyelitis of thigh.

Serum was introduced in the post-operation period subcutaneously on 0.5-0.8 ml of that diluted 10 times by physiological solution; they made three injections with the gaps/intervals 3-4 days. With the necessity the course was repeated in a month. On the basis the comparisons of the obtained results in injured people, treated by serum, and in injured people, who did not obtain its (study of X-ray photographs, morphology of the blood, ROE, skin tests with ATSS and trypan blue, the cytological analysis of wound exudate and microbial "landscape"), V. P. Kordi, M. A. Morozenko and Z. A. Ashkinaidze arrived at the following conclusions. Within the time of treatment was noted an improvement in the general state of injured people, weakened intoxication, wounds were fulfilled by living, succulent granulations. The build-up/growth of the callus occurred by more rapid rate. In 3 injured people sharpened the process, occurred the rejection/separation of sequestration. In general/common/total ATSS it contributed to the limitation of osteomyelitic process and to its transition from the sharp/acute and subacute phase into the chronic.

Prophylaxis.

Prophylaxis of the complications of injuries in war was reduced to the organizational measures which had to in essence ensure rendering to the injured person possibly of the earlier and more qualified aid. With the bullet breaks of thigh, according to the data

of the development of the histories of disease/sickness/illness/malady, successfully were applied the following therapeutic measures of preventive character/nature (Table 201).

Attention is drawn to an increase in last year of the war of a number of injured people with the bullet break of thigh, that obtained first aid for the first hour; considerably increased a number of those subjected to primary surgical processing/treatment, especially for the first six hours; in this case sharply it changed and character/nature processings/treatments - 3 times more frequently began to treat bone wound. It is doubtless, to prophylaxis of bullet osteomyelitis contributed earlier therapeutic immobilization.

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Introduction to the arsenal of therapeutic preparations in the second half the war of penicillin to a considerable degree also contributed to the decrease of a number of complications by osteomyelitis. According to the communication/report of Ya. G. Dubrov at the XXV congress/descent of surgeons, during the use/application during the primary surgical processing/treatment of penicillin a number of complications of osteomyelitis of thigh decreased almost doubly (from 51.3 to 28.30/o).

However, if we turn to the data of the development of the histories of disease/sickness/illness/malady, which show the dynamics of the complications of the breaks of thigh of bullet osteomyelitis for the years of war, then is obtained contradiction with that stated above: in 1941 they were complicated by osteomyelitis 24.7o/o breaks, in 1942 - 31.1o/o, in 1943 - 31.oo/o, in 1944 - 31.8o/o and in 1945 - 32.6o/o.

In actuality this contradiction only seeming. Only in the first year of war the percentage of the complications of the breaks of thigh of osteomyelitis was equal to 24.7, and then, beginning from the second year and to the end of the war, the percentage of osteomyelitis it was held almost on the same level. Is completely plausible the explanation of this position by an improvement in the diagnosis of osteomyelitis which during the first year of war frequently remained unrecognized and, therefore, not noted in the history of disease/sickness/illness/malady, and then in proportion to more careful diagnosis the surveys of this complication they became rarity. It is possible to think that increasing with the experiment/experience of war the clinical and especially roentgenological accuracy of diagnosis leveled the doubtless successes of prophylaxis of osteomyelitis of thigh. Therefore this

complication for a period of latter/last four years remained almost on the same level.

An insignificant increase in the quantity of the complications of osteomyelitis in the years of war, in spite of the perfection of preventive measures, it is explained also by an increase in the severity of injury, what was revealed by the increase of a quantity of crushed breaks with 13.90/o during the first year of war to 15.60/o into the third, fragmentation injuries - from 43.4 to 46.20/o and the associated and combined injuries - from 28.6 to 30.60/o.

Table 201. Principal therapeutic measures of preventive character/nature, realized with the bullet breaks thighs during the first and fourth year of war (in the percentages).

(1) Год войны	(2) Профилактические мероприятия	(3) Оказана первая помощь в течение первого часа после ранения	(4) Получена первичную хирургическую обработку	(5) Произведена первичная хирургическая обработка в течение первых шести часов	(6) Характер обработки		(7) Оказана специализированная помощь в первые двое суток	(8) Применена первая лечебная иммобилизация в первые 10 дней
					(7) рассечение	(8) рассечение и иссечение с обработкой костной раны		
Первый (11)		53,3	55,2	10,5	43,9	9,2	12,5	50,0
Четвертый (12)		72,3	88,0	21,5	30,6	28,7	33,4	72,7

Key: (1). Year of war. (2). Preventive measures. (3). Is shown/rendered first aid for first hour after injury. (4). Was obtained primary surgical processing/treatment. (5). Is produced primary surgical processing/treatment for first six hours. (6). Character/nature of processing/treatment. (7). dissection. (8). dissection and carving with processing/treatment of bone wound. (9). Is shown/rendered specialized aid into first two days. (10). Is applied first therapeutic immobilization during first 10 days. (11). The first. (12). The fourth.

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Issues.

It is known that by osteomyelitis were complicated different by nature breaks and that in these injured people, besides osteomyelitis, frequently occurred other complications and injuries; therefore the study of the issues of breaks with this chronic suffering as bullet osteomyelitis, acquired special importance. In Table 197 was represented the frequency of the recovery of osteomyelitis during the different years of war in connection with the method of treatment.

The nearest results of treatment are characterized by data of the development of the histories of disease/sickness/illness/malady (Table 202).

As can be seen from Table 202, a good functional and anatomical result was achieved/reached with the bullet breaks of thigh, complicated by osteomyelitis, 2 1/2 times it is thinner/less frequent than with the breaks of thigh, not complicated by osteomyelitis. The effect of the long flowed/occurred/lasted suppurative process on the muscles and the joints, especially knee, on one hand, and the need for the expanded operations/processes, directed toward overcoming of infection in the bone, on the other hand, they considerably decreased a quantity of good issues with osteomyelitis.

It is at the same time necessary to note that a number of

amputated in the group injured people with the bullet break, not complicated by osteomyelitis, was almost 6 times more than in injured people, who had this complication, since all amputated during the first days after injury were related to the group of the injured people, who osteomyelitis did not have.

The most frequent complication, which sharply lowered the functional ability of extremity after the bullet breaks of thigh, was the contracture of knee joint. This fact noted all authors. It found bright reflection, also, in represented above data of the development of the histories of disease/sickness/illness/malady.

A quantity of contractures was is equally great both in the group of injured people with osteomyelitis of thigh and in the group of the injured people, who did not have this complication. The significant role in their onset, together with the trauma and the infection, played prolonged immobilization in the gypsum bandage, although itself bandage, apparently was not decisive. With the breaks of the diaphysis of thigh the limitation of motions usually concerned only knee joint, with the breaks of the bones of shin - talocrural despite the fact that into the gypsum bandage consisted in the first case all three large/coarse joints of extremity, and the secondly - two extremital joints.

Table 202. Distribution of injured people with bullet break of thigh, complicated and not complicated osteomyelitis, according to the clinical issues (in the percentages).

(1) Клинический исход	(2) Группа раненых	
	(3) с остео- миелитом	(4) без остео- миелита
Хороший (5)	6,0	15,2
Контрактура (6)	43,2	47,1
Анкилоз (7)	12,3	4,0
Ложный сустав (8)	0,7	0,4
Культи (9)	3,8	20,2
Остеомиелит (10)	15,7	—
Комбинация (11)	14,0	2,1
Прочие исходы (12)	4,3	11,0
Итого (13)	100,0	100,0

Key: (1). Clinical issue. (2). Group of injured people. (3). With osteomyelitis. (4). without osteomyelitis. (5). Good. (6). Contracture. (7). Ankylosis. (8). False joint. (9). Stump. (10). Osteomyelitis. (11). Combination. (12). Other issues. (13). Altogether.

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In combination with the trauma and the associated complications of infection prolonged immobility entailed the formation of resistive contractures, and frequently also ankylosis. The latter with the complications of osteomyelitis appeared in three and the more of times more frequently than in the group of the injured people, who

did not have osteomyelitis; therefore in the formation of ankylosis primary meaning had the long existed infection.

M. O. Friedland in the report at the XXV congress/descent of surgeons referred to the clinical and pathoanatomical investigations by N. P. Cherninoy, who revealed/detected into 74.50/o of bullet breaks of the diapnysis of thigh, complicated by osteomyelitis, different degree pathological changes in the knee joint. The same noted B. V. Punin.

The complication of osteomyelitis considerably retarded the formation of the callus, which can be judged from data of the development of the histories of disease/sickness/illness/malady (Table 203).

Thus, within the earliest periods (1-2 months) the bullet breaks of thigh, complicated by osteomyelitis, were coalesced almost two times thinner/less frequent than without osteomyelitis, and within the latest periods (5 and more than months) are - five times more frequently than without osteomyelitis. On the average due to osteomyelitis the formation of the callus retarded for 1.1 months and therefore was required more lasting immobilization. However, if we turn to Table 202, then it is possible to see that the percentage of contractures in both groups is almost identical (43.2 with

osteomyelitis and 47.1 in the group of the injured people, who did not have osteomyelitis); consequently, as has already been indicated, one duration alone of the stay in the gypsum bandage was not decisive in the formation of contractures.

A decrease in the ossific ability in the presence of osteomyelitis was evinced not only in the delay/retarding/deceleration of consolidation, but also by its full/total/complete suppression with the onset of a larger (almost 2 times) quantity of false joints.

According to B. P. Kirillov's data, the consolidation of the bullet breaks of thigh, not complicated by osteomyelitis, began on the average on the 92nd day, with osteomyelitis - on the 135th day.

The delayed process of forming the callus with bullet osteomyelitis of thigh and the prolonged periods of the retention/preservation/maintaining active infection caused the need of the lasting hospital treatment of injured people (Table 204).

As can be seen from Table 204, the relationship/ratio of the periods of hospitalization in both groups is analogous with the relationship/ratio of the periods of consolidation (Table 203), i.e., considerable difference was noted in the earliest and latest periods.

Table 203. Periods of the formation of the callus in injured people with bullet break of thigh, complicated and not complicated osteomyelitis (in the percentagases).

(1) Группа раненых	(2) Срок образования костной мозоли (в месяцах)					(3)	(4) Итого	(5) Средняя срок
	1	2	3	4	5	6 и более		
С остеомиелитом (6)	10,8	23,0	28,5	16,2	10,0	11,5	100,0	3,8
Без остеомиелита (7)	27,8	36,0	23,4	8,5	2,0	2,3	100,0	2,7

Key: (1). Group of injured people. (2). Period of formation of callus (in months). (3). and more. (4). Altogether. (5). Average period. (6). With osteomyelitis. (7). Without osteomyelitis.

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According to the data of the development of the histories of disease/sickness/illness/malady, the duration of the hospital treatment of injured people with the bullet break of thigh, complicated by osteomyelitis, on the average was equal to 7.1 months, and in the absence of osteomyelitis - 5.5 months. On the separate years it oscillated, having a tendency toward the reduction: in 1941 the duration of treatment it was equal to 7.8 months, in 1942 - 7.6, in 1943 - 7.3, in 1944 - 7.0 and in 1945 - 6.4.

According to B. P. Kirillov, the duration of the treatment of the uncomplicated breaks of thigh was 190 days, and complicated by osteomyelitis - 252 days.

It is very important to determine the state of injured people with the extraction from the hospital.

Given in Table 197 data (pg. 296) attest to the fact that 52.30/o of injured people were discharged from hospital without osteomyelitis; from the remaining injured people it was discharged with calmed down osteomyelitis without fistulas 32.00/o and with abating osteomyelitis with the fistulas - 15.70/o (Table 202).

The result reached should be recognized good, especially in comparison with the first world war (M. O. Friedland, N. N. Priorov et al.). Unfortunately, these results in the significant part proved to be unstable.

M. O. Friedland indicated that the percentage of clinical recovery, high within the early periods of observation, steadily was decreased with 86.70/o into the first half-year to 61.50/o by the third year after operation/process. In the opinion of the overwhelming majority of the authors, the difficulty of achieving the stable recovery of bullet osteomyelitis of thigh consisted in the

complexity of the radical removal/distance of the entire necrotized and infected bone, in consequence of which frequently remained the foci of the latent infection, which conceal a permanent threat of possible aggravations.

Therefore actual representation about the results of treatment can be obtained on the basis of the comparison of the nearest hospital issues with those removed, i.e., by studying the subsequent course of osteomyelitis.

K. A. Ivanov gathered data about the distant results of the treatment of severe bullet osteomyelitis of thigh in the arbitrarily undertaken group of injured people.

After 5 years among the injured people of this group in 26.50/o was observed chronic osteomyelitis, in remaining began either full/total/complete recovery - into 24.10/o (more than 3 years fistulas were not opened/disclosed), or stable remission/abatement - 49.40/o (after the occlusion of fistula it passed from 1 1/2 to 3 years).

The study of the distant results helped to explain the duration of clinical recovery after bullet osteomyelitis in persons with the closed up to the moment/torque or extraction fistula.

Table 204. Distribution of injured people with bullet break of thigh, complicated and not complicated osteomyelitis, according to the duration of hospital treatment (in the percentages).

(1) Группа раненых	(2) Длительность ле- чения (в месяцах)										(3) 10 и более	(4) Итого
	1	2	3	4	5	6	7	8	9			
С остеомиелитом (5)	0,1	1,2	5,4	11,3	16,5	15,7	14,3	11,2	8,0	16,3	100,0	
Без остеомиелита (6)	2,0	7,1	17,5	20,6	19,3	11,7	7,3	4,3	3,5	6,7	100,0	

Key: (1). Group of injured people. (2). Duration of treatment (in months). (3). and more. (4). Altogether. (5). With osteomyelitis. (6). Without osteomyelitis.

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Upon the examination/inspection after 5 years the fistulas are discovered in 23.9o/o and the absence of fistulas - in 76.1o/o of injured people, moreover in 29.1o/o of the number of latter fistulas completely were not opened/disclosed, in 15.2o/o they were opened/disclosed on one time and in 31.8o/o - on 2 times and more.

After the extraction from hospital 19.8o/o of injured people they underwent surgical treatment, 42.6o/o were treated conservatively (physiotherapy, sanatory resort treatment) and 37.6o/o

in no way they were treated.

With the extraction from the hospital in 57.80/o of injured people was established/installed the sharply pronounced extensor contracture of knee joint and in 42.20/o - moderate contracture. After 5 years (on the average) the sharply pronounced contracture was established/installed only in 36.70/o, moderated - in 50.30/o and without the contracture with the full/total/complete volume of motions there were 13.00/o of injured people. Thus, decreased the degree of contracture in 21.10/o and entirely it was eliminated in 13.00/o, i.e., it is somewhat more than in 1/3 injured function of extremity it was reduced or considerably was improved. Therefore only 3.00/o of invalids were continued to put to use with the walking crutches, 23.40/o - by bacillus/rod, and remaining (73.60/o) walked freely.

An improvement in the state of injured people for a period of the next 5 years allowed majority of them to be included/connected in the labor process and to raise its intensity, that also affected a reduction in the disablement, as is evident from Table 205.

In connection with the reduction the degrees of disablement after 5 years worked without limitation by 62.50/o of injured people, to the lightened work they changed 28.90/o and did not work by

8.60/o. From the workers without the limitations the overwhelming majority was returned to the previous, prewar specialty.

The distant results, revealed by K. A. Ivanov, to a considerable degree coincide with G. Ya. Iosset's data.

Z. A. Shiryak published the results of treatment in the postwar period of bullet osteomyelitis of thigh in the Kazan' institute of orthopedics and restorative surgery where to 139 invalids success was achieved/reached in 100 (72.00/o).

N. V. Antelav it was possible as a result of radical surgical treatment to eliminate bullet osteomyelitis in 76.00/o of injured people.

T. Ya. Ar'yev after the radical removal/distance of osteonacrosis, muscular plastic surgery of cavity and penicillin therapy attained recovery to ^{90.0 %} ~~100~~ of all injured people with bullet osteomyelitis.

Thus, muscular plastic surgery of osteomelitic cavities in combination with the introduction of penicillin proved to be the best method of the recovery of the absolute majority of injured people with bullet osteomyelitis of thigh.

Table 205. Distribution of injured people with the bullet break of thigh according to the group of disablement with the extraction and after 5 years (according to K. A. Ivanov's data) (in the percentages).

(1) Время определе- ния инвалидности	(2) Группа инвалид- ности	(3) Первая	(4) Вторая	(5) Третья	(6) Без инва- лидности	(7) Всего
При выписке (8)	2,2	79,1	15,4	3,3	100,0
Через 5 лет (9)	—	14,3	74,8	10,9	100,0

Note. Table 205 depicts only injured people, who answered the questionnaire.

Key: (1). Time of the determination of disablement. (2). Group of disablement. (3). The first. (4). The second. (5). The third. (6). Without disablement. (7). In all. (8). With extraction. (9). After 5 years.

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Bullet osteomyelitis of the bones of shin.

The Lieutenant Colonel of medical service K. P. Ivan'kovich and the distinguished doctor of the RSFSR docent Major of medical service I. L. Glezer.

K. P. Ivan'kovich and I. L. Glezer.

Statistical survey/coverage.

The majority of the works on osteomyelitis, which appeared in the press/printing during the years of the Great Patriotic War and the postwar period (M. O. Fridland, A. T. Lidskiy, Ya. M. Bruskin, S. S. Girgolav, T. Ya. Ar'yev et al.), treats about the entire problem of osteomyelitis so the same.

Statistical information about the complications of osteomyelitis of the bullet breaks of the bones of shin in the Great Patriotic War

are scanty and contradictory. Authors' majority cite data about the specific gravity/weight of osteomyelitis of the bones of shin with respect to osteomyelitis of all bones of skeleton (Table 206).

As can be seen from Table 206, injured people with osteomyelitis of the bones of shin were from 15.4 to ^{30.0}~~30.0~~ % of total number of injured people with osteomyelitis of all bones of skeleton, occupying, according to the data of authors' majority, the second place of those afterward wounded with osteomyelitis of thigh (16.0-56.00/o); according to the data of Ya. M. Bruskin and M. O. Fridlanda, injured people with osteomyelitis of the bones of shin they occupied the first place.

In the relation to osteomyelitis separate of the bones of shin the materials in all authors are similar. Osteomyelitis of the tibia among osteomyelitis of all bones of skeleton into two and more of times was encountered more frequently than osteomyelitis of fibular bone.

Considerably less frequent it is possible to meet in the literature of the information about a quantity of the complications of bullet osteomyelitis in the injured people with the break of shin bones. Such information is found by V. D. Anchelevich (20.00/o, the deep rear) and in D. M. Baranovskiy (51.00/o, near rear). The difference in the numerals in these authors, apparently is

explained by the fact that they observed injured people in the different stages.

According to the data of the development of the histories of disease/sickness/illness/malady, to entire quantity of breaks of the bones of shin the frequency of the complications of osteomyelitis can be calculated from 41.8 to 46.0o/o, depending on the content, put in into the concept "bullet osteomyelitis". The breaks of the tibia were complicated by osteomyelitis in 57.6o/o of injured people, fibular - in 35.2o/o, the breaks of simultaneously two bones - in 36.2o/o.

Table 206. The specific gravity/weight of injured people with bullet osteomyelitis of the bones of shin and thigh among the injured people with osteomyelitis of all bones of skeleton in the Great Patriotic War (according to different authors' data) (in the percentages).

(1) Автор	(2) Время наблюдения	(3) Место наблюдения	(4) Остео- миелит костей голеи	(5) Остео- миелит бедр
(6) В. Д. Анчелевич	(7) Весь период войны	(8) Глубокий тыл	15,4	25,4
(9) И. М. Левинтов	1942—1944 гг.	(10) Ближний и глубокий тыл	16,1	56,0
(11) М. И. Куслик	(12) То же	(13) То же	20,6	21,8
(14) И. Л. Глезер	(15) Весь период войны	(16) Глубокий тыл	23,4	24,6
(17) Я. М. Брускин	1943 г.	(18) То же	27,0	16,0
(19) М. О. Фридланд	1943—1945 гг.	(20) Ближний и глубокий тыл	30,0	20,0

Key: (1). Author. (2). Time of observation. (3). Observation point. (4). Osteomyelitis of bones of shin. (5). Osteomyelitis of thigh. (6). V. D. Anchelevich. (7). Entire period of war. (8). Deep rear. (9). I. M. Levintov. (10). Near and deep. (11). M. I. Kuslik. (12). the same. (13). I. L. Glezer. (14). Ya. M. Bruskin. (15). M. O. Fridland.

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Is here represented the frequency of osteomyelitis to entire number of injured people with the break, including dead persons and amputated in the first days after injury as a result of the severe trauma, hemorrhage and gas infection, in which yet could not develop

osteomyelitis; therefore a number of injured people with osteomyelitis with break of both bones of shin proved to be almost the same as with the break of fibular bone. If we exclude dead persons and amputated, then will be obtained the following frequency of osteomyelitis with the break of the tibia - 59.00/o, fibular - 35.30/o, both bones - 71.40/o, in average/mean 48.10/o, i.e., with simultaneous break of both bones of shin osteomyelitis was encountered most frequently.

On the basis of data of the development of the histories of disease/sickness/illness/malady it is possible to present the following basic division of osteomyelitis of the bones of shin, according to general/common/total classification ¹ (table 207).

FOOTNOTE ¹. Classification is given in volume 2 of "work" on pg. 329.
ENDFOOTNOTE.

As can be seen from table 207, of the total number of injured people with osteomyelitis of the bones of shin most of all it was observed injured people with osteomyelitis of the tibia. This is explained not only by the fact that the tibia more frequent than others was surprised by osteomyelitis, but also fact that among the breaks of the bones of shin predominated the breaks of the tibia (vol. 15, pg. 451).

On the same reasons the second place occupied osteomyelitis of both bones of shin and third place - osteomyelitis of fibular bone.

Thus can be explained the distribution of wounds according to the localization of osteomyelitis.

Conditions of the onset of bullet osteomyelitis of the bones of shin.

The basic "leading" condition, which frequently facilitates onset and development of bullet osteomyelitis, was the character/nature of the damage to bone and the soft tissues. The degree of the damage of soft tissues in the majority of injured people corresponded to the degree of the damage to bone, since the fragments of the destroyed bone were secondary projectiles and damaged soft tissues. In view of this with the following presentation the severity of injury will be characterized by the form/species of break (table 208).

As can be seen from table 208, in the frequency of the complications of osteomyelitis it is possible to secrete three groups of the breaks: 1) fragmented ^{60.3} (~~60.3~~-66.5o/o), 2) oblique, cross, perforated and crushed 47.2-51.5o/o) and 3) edge/boundary 38.1o/o); in general osteomyelitis were most frequently complicated those breaks with which it was noted the considerable decomposition of bone.

Table 207. Distribution of bullet osteomyelitis of the bones of shin
(in the percentages).

(1) В зависимости от вида поврежденной кости	(2) В зависимости от локализации	(3) По течению
(4) Малоберцовая кость . . . 25,8	(5) Верхний эпи-метафиз . . . 22,7	(6) Острый 16,4
(7) Большеберцовая кость . . . 43,7	(8) Диафиз 42,9	(9) Хронический . . . 83,6
(10) Обе кости 28,5	(11) Нижний эпи-метафиз . . . 34,4	
(12) Итого 100,0	100,0	100,0

Key: (1). Depending on the form/species of the damaged bone. (2). Depending on localization. (3). With course. (4). fibular bone. (5). Upper metaphisial. (6). Sharp/acute. (7). Tibia. (8). Diaphysis. (9). Chronic. (10). Both bones. (11). Lower epimetaphysial. (12). Altogether.

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It is necessary to say that the frequency of the complications of osteomyelitis of the bones of shin depended not only on degree and form of fracture of bone and damage of soft tissues, but also on the series/number of the measures, directed toward warning/prevention of complications.

Thus, for instance, breaks, most rarely complicated by osteomyelitis (edge/boundary, crushed and perforated), into the first

to six hours after injury were processed in a larger number of cases, than the breaks fragmented, cross and oblique (vol. 15, pg. 497), with which more frequently were observed the complications of osteomyelitis.

With the isolated/insulated breaks of the separate bones of shin the frequency of the complications of osteomyelitis the different in the form/species breaks on the whole was the same, but there were some differences: with the breaks of fibular bone osteomyelitis most frequently was observed with the crushed break, since the breaks of fibular bone rarely led to the primary amputation. they were noted and other insignificant differences.

The standing of scrap with the full/total/complete bullet breaks of the bones of shin, it is doubtless, had an effect on the onset of osteomyelitis (table 209).

Table 208. Frequency of bullet osteomyelitis of the bones of shin depending on the character/nature of break (in the percentages).

(1) Название кости	(2) Вид перелома	(3) Длительная	(4) Краями	(5) Крупноос- кольчатая	(6) Мелкоос- кольчатая	(7) Раздроб- ленная	(8) Поперечный	(9) Посой	(10) В среднем
(11) Малоберцовая		26,3	30,9	44,9	43,4	54,8	32,6	19,6	35,2
(12) Большеберцовая		49,6	40,8	76,2	77,4	66,8	42,1	60,7	57,6
(13) Обе кости		47,9	43,3	71,4	74,8	14,3	69,8	59,8	36,2
(14) В среднем		47,2	38,1	66,5	60,3	47,5	48,0	51,5	41,8

Key: (1). Name of bone. (2). Form/species of break. (3). Perforated.
 (4). Edge/boundary. (5). Large-splintered. (6). Small-splintered.
 (7). Crushed. (8). Cross. (9). By scythe. (10). On the average. (11).
 Fibular. (12). Tibial. (13). Both bones. (14). On the average.

Table 209. Distribution of injured people with bullet break of the separate bones of shin, complicated and not complicated osteomyelitis, according to the degree of the bias of scrap (data of D. G. Rokhlin and V. P. Zadornova) (in the percentages).

(1) Локализация перелома	(2) Группа раненых	(3) Смещение отломков			
		(4) отсутствовало	(5) незначительное	(6) умеренное	(7) значительное
(8) Малоберцовая кость	(9) С остеомиелитом . . .	2,0	20,9	54,1	23,0
	(10) Без остеомиелита . . .	71,3	21,2	7,5	—
(11) Большеберцовая кость	(9) С остеомиелитом . . .	1,9	31,8	47,4	18,9
	(10) Без остеомиелита . . .	68,6	21,2	10,2	—
(12) Обе кости	(9) С остеомиелитом . . .	2,7	13,7	45,2	38,4
	(10) Без остеомиелита . . .	(13) Мало наблюдений			

Key: (1). Localization of break. (2). Group of injured people. (3). Bias of scrap. (4). It was absent. (5). Insignificant. (6). moderated. (7). considerable. (8). Fibular bone. (9). With osteomyelitis. (10). Without osteomyelitis. (11). Tibia. (12). Both bones. (13). It is small observations.

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Consequently, for the breaks of the bones of shin, complicated by osteomyelitis, is characteristic the bias of scrap of all degrees, since the disturbed with the bias of scrap blood circulation is unfavorable moment/torque for the healing of fracture.

Almost equally frequently was encountered osteomyelitis with the breaks at different levels of the bones of the shin: in upper third - 44.80/o, in middle third - 48.80/o and in the lower - 45.00/o. Small differences are explained by the fact that on the average third fragmented breaks, which gave a great number of complications of osteomyelitis, were observed more frequently than in other thirds: upper third - 30.50/o, middle third - 50.40/o and lower third - 42.50/o. In connection with this the distribution of all complications of osteomyelitis of the bones of shin, undertaken 100, according to the level of break was such, which to middle third fell almost 2 times more (42.90/o), and to the lower - 1 1/2 times more (34.40/o), than to the upper (22.70/o).

By the following most important condition for onset and development of osteomyelitis was the contamination of wound pathogenic microbes. It is known that the great contamination by them was observed with the fragmentation and blind-end injuries. Osteomyelitis with the blind-end injuries was encountered more frequently (50.00/o) than with the through ones (44.00/o), with the fragmentation injuries it is more frequent (48.30/o) than with the bullet ones (44.70/o), and with the breaks with the foreign body it is more frequent (59.70/o) than without it (39.20/o).

Are exponential in this respect data of D. G. Rokhlin and V. P.

Zadvornov, that relate to the evacuation hospitals of the near and deep rear (table 210).

From table 210 it is evident that among the bullet breaks of the bones of shin, not complicated by osteomyelitis, predominated the perforating bullet injuries with the presence of metallic foreign bodies predominantly in the soft tissues, whereas with the complication of osteomyelitis predominated blind-end fragmentation injuries with the localization of foreign bodies mainly between the bone scrap and in the bone.

According to the data of the development of the histories of disease/sickness/illness/malady, could not be established for the dependence of the development of bullet osteomyelitis on the character/nature of the applied transport immobilization; whereas delay in its use/application, apparently contributed to the development of osteomyelitis (table 211).

Despite the fact that the injured people with osteomyelitis of the bones of shin had more than full/total/complete breaks (81.20/o), than in injured people without osteomyelitis (73.70/o), transport immobilization in the first was applied somewhat later than in the second.

Table 210. Distribution of injured people with bullet break of the bones of shin, complicated and not complicated osteomyelitis, according to character/nature and means of injuries, or according to the localization of foreign bodies (based on materials of D. G. Rokhlilin and V. P. Zadornova) (in percent).

(1) Группа раненых	(2) Характер ранения			(3) Вид ранения			(4) Металлические и инородные тела находились			
	(5) сквоз- ные	(6) сле- пые	(7) всего	(8) пуле- вые	(9) оско- лоч- ные	(10) всего	(11) в мяг- ких тканях	(12) между отлом- ками кости	(13) в ко- сти	(14) всего
(13) С остеомиелитом	38,6	61,4	100,0	31,4	68,6	100,0	32,6	51,1	16,3	100,0
(14) Без остеомиелита	81,0	19,0	100,0	67,1	32,9	100,0	81,7	13,3	5,0	100,0

Key: (1). Group of injured people. (2). Character/nature of injury. (3). Means of injury. (4). Metallic foreign bodies were located. (5). through. (6). blind. (7). in all. (8). bullet. (9). fragmentation. (10). in soft tissues. (11). between scrap of bone. (12). in bone. (13). With osteomyelitis. (14). Without osteomyelitis.

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As is known, primary surgical processing was performed mainly for warning/preventing the development of the complications of bullet breaks. Its role in the relation to the complications of osteomyelitis is represented in Table 212-215.

From Table 212 it is evident that a small number of complications of osteomyelitis was observed during the processing in the first six hours after injury. However, to explain this one only by period of processing, without taking into account the form/species of break, is impossible, since it is known that in the first six hours after injury was processed more than such breaks which most rarely were complicated by osteomyelitis (edge/boundary, crushed and perforated).

On the value of the character/nature of processing for the development of osteomyelitis with the breaks of the bones of shin gives representation Table 213.

Table 211. Distribution of injured people with bullet break of the bones of shin, complicated and not complicated osteomyelitis, according to the character/nature of break and the period of the use/application of transport immobilization (in the percentages).

(1) Группа раненых	(2) Характер перелома					(3) Время применения иммобилизации		
	(4) дырчатый и краевой	(5) оскольчатый	(6) раздробленный	(7) прочие	(8) всего	(9) первые сутки	(10) позже	(11) всего
(11) С остеомиелитом . .	18,8	56,6	12,6	12,0	100,0	64,0	36,0	100,0
(12) Без остеомиелита . .	26,3	29,3	32,6	11,8	100,0	66,0	34,0	100,0

Key: (1). Group of injured people. (2). Character/nature of break. (3). Time of use/application of immobilization. (4). perforated and edge/boundary. (5). fragmented. (6). crushed. (7). other. (8). in all. (9). first day. (10). it is later. (11). With osteomyelitis. (12). Without osteomyelitis.

Table 212. Frequency of the development of bullet osteomyelitis of the bones of shin in connection with the period of production in the primary surgical processing (in the percentages).

(1) Сроки	(2) Первые сутки			(3) Вторые сутки	(4) Обработ- ка не произво- дилась
	(5) 6 ча- сов	(6) 7-24 ча- са	(7) в среднем		
(8) Число осложнений остеомиелитом . .	39,0	48,4	41,8	44,0	38,8

Key: (1). Period. (2). First day. (3). Second day. (4). Processing was not performed. (5). hours. (6). hour. (7). on the average. (8). number of complications of osteomyelitis.

Table 213. Frequency of the development of bullet osteomyelitis of the bones of shin after the different character/nature of primary surgical processing (in the percentages).

(1) Характер первичной хирургической обработки	(2) Рассечение	(3) Рассечение и иссечение	(4) Рассечение и иссечение				(9) Обработка не проводилась
			(5) с перевязкой сосудов	(6) с удалением инородных тел	(7) с удалением костных осколков	(8) с обработкой фрагментов кости	
(10) Число осложнений остеомыелитом	46,6	46,3	40,7	50,2	58,4	72,7	38,8

Key: (1). Character/nature of primary surgical processing. (2). Dissection. (3-4). Dissection and carving. (5). with dressing of vessels. (6). with removal/distance of foreign bodies. (7). with removal/distance of bone fragments. (8). with processing of fragments of bone. (9). Processing was not performed. (10). Number of complications of osteomyelitis.

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Consequently, after the operations/processes, produced on the soft tissues, osteomyelitis appeared somewhat less frequent than after manipulations on the bones.

Most rarely were observed the complications of osteomyelitis when primary surgical processing was not performed at all, i.e., with the lightest breaks, and when during the primary surgical processing

were bandaged large vessels, as a result of which soon after it in the considerable percentage of injured people it was necessary to make amputation (chapter I).

It is known that the character/nature of primary surgical processing was found in the dependence on the character/nature of injury, the severity of injury in the majority of injured people corresponding to the severity of break. Therefore for a more precise reflection of connection/communication between the character/nature of processing and the onset of the complications of osteomyelitis is given information taking into account the form/species of break (table 214), where they concern the most stable forms of osteomyelitis which were not cured within the retention time of injured people in the hospital.

As can be seen from table 214, perforated and edge/boundary breaks most rarely were complicated by osteomyelitis with the abstention from the primary surgical processing and after the simple dissection of wound; most frequently osteomyelitis was observed after dissection with the removal/distance of bone fragments.

With the fragmented breaks the best results were obtained with the abstention from the processing and during the simple dissection; worse - after the removal/distance of bone fragments.

With the crushed breaks after the removal/distance of bone fragments or after dissection and carving of wound the results were more favorable: after simple dissection were observed the worse results.

Oblique, cross and longitudinal breaks were complicated by osteomyelitis most rarely after dissection with the carving and with the abstention from the processing. Most of all of complications osteomyelitis was when to the dissection with the carving they connected the removal/distance of bone fragments.

Consequently, nonsplintered breaks were less complicated by osteomyelitis when was performed simple processing (dissection, carving) or when it in no way was conducted. Fragmented breaks better flowed/occurred/lasted with the abstention from the processing and after simple dissection, and those crushed - worst of all after simple dissection. This concerns predominantly processing breaks on DMP, where was operated bulk of injured people (table 215).

Table 214. Frequency of bullet osteomyelitis of the bones of shin among another clinical sources in connection with the form/species of break and the character/nature of primary processing (in the percentages).

(1) Характер обработки	(2) Вид перелома	(3) Дырчатый и краевой	(4) Осколь- чатый	(5) Раздроб- ленный	(6) Поперечный, продольный и косой
(7) Рассечение		9,9	20,8	16,3	15,5
(8) Рассечение и иссечение		11,8	22,9	9,1	8,3
(9) Рассечение, иссечение и удале- ние костных осколков		16,6	25,4	8,7	25,4
(10) Обработка не производилась		7,2	17,1	13,4	11,2

Key: (1). Character/nature of processing. (2). Form/species of break. (3). Perforated and edge/boundary. (4). Fragmented. (5). Crushed. (6). Cross, longitudinal and by scythe. (7). Dissection. (8). Dissection and carving. (9). Dissection, carving and removal/distance of bone fragments. (10). Processing was not performed.

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From table 215 it is evident that injured people with osteomyelitis (in contrast to the injured people, who did not have this complication), that obtained primary processing on DMP, it was more, but obtained it in PPG and army evacuation hospitals - it is less.

The reason for this difference consists in the fact that the heaviest injured people, who need the fastest surgical aid, most frequently were treated on DHP, whereas more easily injured people in connection with the tactical situation they frequently guided for the primary surgical processing directly into PPG and army evacuation hospitals and they in this case frequently fell into specialized osteoarticular hospital.

Thus, are determined the following conditions for onset and development of bullet osteomyelitis of the bones of the shin:

1. The severity of trauma - with breaks of both bones osteomyelitis was observed most frequently.
2. Large sizes/dimensions of bone - breaks of tibia were complicated 1 1/2 times more frequently than breaks of fibular bone.
3. Full/total/complete breaks, especially fragmented with bias of scrap.
4. Blind-end and fragmentation injuries.
5. Delay with imposition of transport immobilization.

6. Production in primary surgical processing is later than 6 hours after injury.

Course, diagnosis and complications.

In the course of bullet osteomyelitis of the bones of shin it was necessary to distinguish two basic forms - sharp/acute and chronic; from a total number of injured people with osteomyelitis of the bones of shin (41.80/o) sharp/acute form was observed in 6.80/o, chronic - in 35.00/o, i.e., in a number of all injured people with osteomyelitis of the bones of shin in the fraction/portion of sharp/acute ones it was 16.40/o, and in the fraction/portion of the chronic - 83.6%. Septic intoxication was observed in one out of five injured person with acute osteomyelitis of the bones of shin. Septic complications with the break of the bones of shin are examined in chapter of the V present volume.

Thus, the sharp course of osteomyelitis and septic intoxication with it were observed during the breaks of the bones of shin less frequent than with the breaks of thigh.

By the sharp/acute form of osteomyelitis bullet breaks were complicated within the next few days after injury; it was in essence the consequence of virulent infection, since the relationships/ratios between acute and chronic osteomyelitis with the different breaks differed little from each other, as is evident from table 216.

Table 215. The distribution of injured people with bullet break of the bones of shin, complicated and not complicated osteomyelitis, in the stages of evacuation, in which was performed primary surgical processing (in the percentages).

(1) Группа раненых	(2) Этап эвакуации	ДМП	ППГ	(3) ЭГ армии	(4) Другие	(5) Всего
(6) С остеомиелитом		79,7	16,2	1,8	2,3	100,0
(7) Без остеомиелита		69,7	20,6	3,0	6,7	100,0

Key: (1). Group of injured people. (2). Stage of evacuation. (3). army. (4). Others. (5). In all. (6). With osteomyelitis. (7). Without osteomyelitis.

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As can be seen from table 216, the specific gravity/weight of acute osteomyelitis with all breaks was almost identical, eliminating fragmented ones and cross ones, with which it proved to be above as a result of the larger decomposition of bone tissue with these breaks.

Diagnosis and clinical course of acute osteomyelitis of the bones of shin in view of the more surface arrangement of the latter were on the whole more the lungs, than with osteomyelitis of thigh, and in the parts greatly they differed little from the course of

acute osteomyelitis of other long tubular bones. Therefore, to avoid repetition, they in detail be brought will not be.

An example of the sharp course of osteomyelitis of the bones of shin can be the following observations.

S., 21 year, 14/XII 1943 is injured by bullet into the left shin. First aid is shown/rendered by medical orderly. Then on PMP is set the diagnosis: the perforating bullet injury of upper third of left shin with the damage of bones; is produced dress/lavatory of wounds, are superimposed aseptic bandage, Diedrichs' splint, is introduced 1 ml of morphine even 1500 AE antitetanic serum.

After 11 hours the injured person entered on DMP with the tourniquet which was superimposed in the way. On DMP the tourniquet was removed, hemorrhage was not renewed. Dress/lavatory of wounds, bandage with the solution of potassium permanganate, fixation by the splints of Cramer. During the same day the injured person in the satisfactory state arrived in ^{Kh}PPG, where was also changed bandage. Here subsequently gradually the state of injured person deteriorated, appeared scarce serous- suppurative liberations/excretions from the wounds and the swelling of shin, temperature achieved 39°. Injured person into the states of average/mean severity was evacuated 25/XII in another KhPPG, where it was discovered: the state of average/mean

severity, on the external surface of upper third of left shin wound by the size/dimension 1x1.5 cm, and on the internal - by size/dimension 3x7 cm; liberation/excretion serous- suppurative. Foot and shin are edematic. Are superimposed bandage with hypertonic solution of common salt, splint of Cramer. Within the next few days the state of injured person continued to deteriorate, temperature achieved 39.7°, tongue became dry; was identified acute osteomyelitis. 28/XII under ether anesthesia is produced the revision of wound after dissection of both wound openings/apertures. Suppurative flows is not discovered, extremity is fixed/recorded by anechoic gypsum bandage to middle third of thigh.

In spite of the produced operation/process and the general/common/total treatment, the state of injured person continued to remain heavy. In view of this 3/I 1944 gypsum bandage was taken/removed; wounds granulate well, separated scanty, suppurative, swelling of shin somewhat it decreased. Are superimposed aseptic bandage, fixation by the splints of Cramer. Subsequently the temperature gradually was lowered to subfebrile numerals, and injured person in the satisfactory state 18/I was converted into the front evacuation hospital, whence 19/II it was evacuated in the deep rear. 6/III it arrived in the rear evacuation hospital. 9/III with the X-ray analysis is determined the crushed break of upper third of both bones of left shin with the presence of small cavities and

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sequestrations: nonstrengthened callus in the region of break. 11/III
the analysis of the blood: Hb 650/o, eras. 3600000, l. 7500; ROE 5 mm
an hour, 14/III under the cerebrospinal anesthesia 50/o novocaine
(1.75 ml) produced expanded sequestrectomy. Toward the end of June
the wounds healed, was reduced the function of left lower extremity,
15/VII injured person was discharged by that recovered.

Table 216. Frequency of acute and chronic bullet osteomyelitis of the bones of shin with the different types of break (in the percentages).

(1) Форма остео- миелита	(2) Вид перелома	(3) Дыр- чатый	(4) Крае- вой	(5) Крупно- осколь- чатый	(6) Мелко- осколь- чатый	(7) Раздроб- ленный	(8) Попереч- ный	(9) Косой
(10) Острая		6,8	6,7	9,3	8,5	6,8	8,8	7,1
(11) Хроническая		40,4	31,4	57,2	51,8	40,7	39,2	44,4

Key: (1). Form of osteomyelitis. (2). Form/species of break. (3). Perforated. (4). Edge/boundary. (5). Large-splintered. (6). Small-splintered. (7). Crushed. (8). Cross. (9). By scythe. (10). Sharp/acute. (11). Chronic.

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Thus, injured S, was obtained the heavy bullet injury of upper third of left shin with breaking up of both bones. Primary surgical processing was not produced, in view of this developed acute osteomyelitis apropos of which was produced the expansion of wounds; suppurative flows it was not discovered, since process was localized in the bones. This simple operation/process gave favorable result. In 3 months after injury was made expanded sequestrectomy. 7 Months after injury the injured person is discharged with the healed wounds and the restored/reduced by function extremity.

However, not always with acute osteomyelitis of the bones of shin it was possible to obtain favorable course after one dissection along of wounds. In other injured people is performed on several/somewhat operations/processes, including complex reworking of wound. As illustration can serve the following observation.

P., 37 years, 19 hours 4/VIII 1943 it is injured by bullet into the right shin. Aid rendered sanitary instructor. After 2 hours on DMP is changed the bandage, is produced immobilization by splints, is introduced antitetanus serum. With the diagnosis the "perforating bullet injury of middle third of right shin with the damage of bones" the injured person is directed on DMP, where he arrived 11 hours 5/VIII. On the external and front face of middle third of right shin it is discovered on the wound opening/aperture by size/dimension to 1x1 cm. Wounds are split, discovered fragmented break of both bones of shin. Into the wound cavity is introduced the tampon with 20/o solution of chloramine, extremity is fixed/recorded by the Diedrichs' splint. 7/VIII through GOPEP injured person is evacuated into the front evacuation hospital, where he arrived 9/VIII. After the admission the state of the average/mean severity: there are wounds to anterointernal (17x8 cm) and external surfaces of shin (13x4 cm) with the rose-colored granulations and small suppurative discharge. Within the next few days the state of injured person considerably deteriorated, temperature achieved 40°. 13/VIII under the local

anesthesia is made additional section/cut; however, suppurative flows are not detected. In spite of the energetic general/common/total treatment by streptocide and by alcohol, improvements did not begin, 16/VIII under overall ether anesthesia is produced an even larger expansion of wounds with processing of bones and additional section/cut. Into all wounds are introduced the tampons with the solution of potassium permanganate; is superimposed gypsum cast. During the first three days the state of injured person remained heavy. 20/VIII is superimposed anechoic gypsum bandage. Subsequently the temperature gradually was lowered to 38°, and 8/IX injured person was converted into the hospital BHP. 10/IX in the X-ray photograph is discovered fragmented break of both bones of right shin in middle third. With 14 on 17/IX in injured person is noted enterocolitis and pneumonia; temperature to 40°. Analysis of the blood 14/IX; Hb 60g/o, eras. 4200000, l. of 7200 p. 6g/o, S. 52o/o, lymphs. 32o/o, . 10o/o; ROE 19 mm an hour. Treatment by sulfidine and by bacteriophage gave a good result; with 19/IX the state of injured person it became satisfactory at a variable subfebrile temperature. 9/II 1944 in the back evacuation hospital is produced sequestrectomy. 8/VI 1944 injured person is discharged with osteomyelitis of the bones of right shin, with the fistulas and the limitation of mobility in the talocrural joint.

Consequently, in injured p., in spite of the in proper time

produced primary surgical processing and twofold reworking, acute osteomyelitis flowed/occurred/lasted considerably heavier and was terminated by the worse result after more lasting treatment than in injured S., although the severity of injury in both injured people was identical.

To completely eliminate osteomyelitic focus in the sharp/acute form it was possible rarely, usually sharp course it was finished with transition into the chronic form, with which for the liquidation of focus in the majority of injured people were conducted supplementary operations/processes.

Chronic course without the preliminary sharp/acute stage was observed in every 5 and 6 injured people with osteomyelitis of the bones of shin.

As an example of limply current primary-chronic osteomyelitis of shin without the distinctly expressed sharp/acute phenomena can serve the following observation.

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P., 33 years, it is injured 31/VIII 1943 by bullet into the left shin. After 18 hours with the diagnosis the "blind-end bullet injury

of left shin with the break of bones" it was delivered in ^{Kh}PPG, where under the local anesthetization produced the dissection of the inlet of wound was superimposed gypsum cast, 4/IX in GLR it is noted: on the internal surface of lower third of left shin wound by the size/dimension 12x5 of cm, around the wound swelling and subcutaneous hemorrhage. Dress/lavatory of wound, bandage with the hypertonic solution. 14/IX in EG is superimposed the anechoic gypsum bandage, in which the injured person is evacuated in rear EG.

30/IX in the X-ray photograph is discovered crushed break of both bones of left shin in lower third and metallic foreign body in upper third over the external surface.

13/X is taken/removed gypsum bandage; 26/X under the local anesthetization is removed bullet. 18/XI upon the roentgenological examination/inspection discovered the weak formation of the callus, the cavity between the scrap of the tibia, fine/small bone sequestrations and metallic fragment by size/dimension 0.5x0.3 see 30/XI under the local anesthesia it is produced sequestrectomy with the removal/distance of metallic fragment. 7/I 1944 the roentgenological examination/inspection: against the background of the callus of the tibia are noted the sections of rarefaction/evacuation.

10/I 1944 injured person is discharged with osteomyelitis of left tibia and ankylosis of left talocrural joint.

Thus, in this injured person heavy break of both bones of lower third of shin flowed/occurred/lasted from the very beginning without the sharp/acute phenomena, since osteomyelitis was accompanied by the necrosis of the insignificant sections of bone.

During the study of hemograms of injured people with chronic osteomyelitis of the bones of shin in the overwhelming majority was noted expressed lymphocytosis (30-40o/o). A quantity of leukocytes from 6000 to 10000 would appear as constant and frequently it depended on localization of process - than nearer to the joint, the greater leukocytosis. Osteomyelitis of the diaphysis of fibular bone usually flowed/occurred/lasted without an increase in the quantity of leukocytes.

From the side of the red blood of special changes it was not noted, with exception of the incidence/drop in the percentage of hemoglobin proportional to the severity of process. The reaction of settling erythrocytes in 75.0o/o of subjects was blurred increased (to 30 mm an hour), and in 25.0o/o - it is above 30 mm an hour.

Table 217. Distribution of the roentgenological signs of bullet osteomyelitis of the bones of shin within the different periods after injury (according to D. G. Rokhlin and V. P. Zadvornovoy) (in the percentages).

(1) Признаки огнестрельного остеомиелита	(2) Сроки после ра- нения (в днях)							(5) Итого
	(3) До 30	31-60	61-90	91-120	121-150	151-180	(4) 181 и более	
(6) Прогрессирующий остео- некроз	1,4	14,0	12,2	4,0	0,2	—	—	31,8
(7) Прогрессирующий остеолиз	0,4	2,6	2,2	1,0	—	—	—	6,2
(8) Сиквестры	0,2	3,8	5,2	3,6	1,6	2,0	0,6	17,0
(9) Отслоенный периост	—	1,2	2,2	0,6	—	—	—	4,0
(10) Бахромчатый	—	0,8	2,6	0,6	—	0,2	—	4,2
(11) Многослойный	—	—	1,8	1,6	0,4	—	0,4	4,2
(12) Ассимилированный периост	—	—	1,8	2,4	2,0	2,0	0,8	9,0
(13) Сочетание признаков	0,2	1,8	4,8	7,0	5,4	2,8	1,6	23,6
(5) Итого	2,2	24,2	32,8	20,8	9,6	7,0	3,4	100,0

Key: (1). Signs of bullet osteomyelitis. (2). Period after injury (in days). (3). To. (4). and more. (5). Altogether. (6). Progressive osteonecrosis. (7). Progressive osteolysis. (8). Sequestrations. (9). Scaled periosteum. (10). Fringed periosteum. (11). Laminated periosteum. (12). Assimilated periosteum. (13). Combination of signs.

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The roentgenological method of study for recognition and studying bullet osteomyelitis has special importance, since gives the possibility to define the changes, which occur in the periosteum and

bone in the course of break, as is evident from the materials of D. G. Rokhlin and V. P. Zadornovoy (Tabl. 217).

From given in Table 217 data it is evident that within the earliest periods were detected such roentgenological symptoms of acute bullet osteomyelitis of the bones of shin as progressive osteonecrosis and osteolysis, scaled and fringed periosteum.

These signs only rarely were determined toward the end of the first month, usually they were distinguished in the course of the second and third month after injury.

Thus, of 31.80/o of progressive osteonecrosis 14.00/o of it were identified in the course of the second month and 12.20/o - in the course of the third month; of 6.20/o of progressive osteolysis 2.60/o of it it is identified in the course of the second month and 2.20/o - during the third month, etc.

Sometimes with violently flowed/occurred/lasted osteomyelitis of one of the bones of the shin was revealed reactive or sympathetic periostitis on another, undamaged/uninjured bone.

The roentgenological symptoms of chronic bullet osteomyelitis of the bones of shin - sequestrations in the cavities and at the same

time assimilated or partially assimilated layerings - were detected most frequently, beginning from 3-4 months after injury, rarely - within the earlier periods. Thus, of 17.0o/o of formations of sequestrations in the course of the third month it is identified by 5.2o/o, and during the fourth - 3.6o/o.

The combination of signs was observed almost in quarter of all injured people (23.6o/o), moreover a great number of combinations fell for the third (4.8o/o), fourth (7.0o/o) and fifth (5.4o/o) month when they recognized acute osteomyelitis they were combined with the signs of chronic.

The aggravation of chronic osteomyelitis of the diaphysis of the bones of shin, as the diaphysis of other tubular bones, it is characterized by new scaling or fringing of periosteum, by appearance of new sequestrations or by their coming out from the bone.

The heaviest form of bullet osteomyelitis (total central necrosis) was discovered (based on materials of author development) in the bones of shin only one time (in the tibia).

With chronic osteomyelitis the roentgenological examination/inspection of osteomyelitis of the bones of shin it helped fistulography. Based on materials of I. L. Glezer, this method

of examination/inspection (fistulography) was applied in 17.00/o of injured people with osteomyelitis of the bones of shin.

Bullet osteomyelitis of the bones of shin depending on the character/nature of bullet break had very diverse roentgenological picture.

In some injured people in one of the bones of shin - in the diaphysis or in metaphysis - it was possible to reveal/detect the cavity of diverse form. Sometimes this cavity conducted to another section of the bone where was arranged/located one additional cavity. These cavities rarely were free from the sequestrations and the fine/small bone scrap.

Sometimes into the cavity (or in one of the cavities), besides sequestration, was located foreign body.

X-ray examination gave always the possibility to trace in the dynamics the course of bullet osteomyelitis of the bones of shin and to apply the appropriate procedure of treatment.

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On overcoming of bullet osteomyelitis in the presence of

corresponding clinical data the roentgenologist could judge on the basis of the absence of cavity and sequestrations, absence of the scaled and fringed periosteum, on the basis of the presence of calm, although changed, structures and completely assimilated periosteal layerings.

The approximation/approach of the period of operational intervention apropos of bullet osteomyelitis of the bones of shin was in many respects obliged to the in proper time carried out X-ray examination/inspection.

The information about the stage of the first roentgenological examination/inspection in injured people with osteomyelitis of the bones of shin is represented in Table 218.

Roentgenological examination/inspection for the diagnosis of the character/nature of damage more frequently was conducted in the army and army region; therefore in the group of the injured people, who did not have osteomyelitis, then there was somewhat greater than in the injured people with osteomyelitis (12.3 and 9.4o/o). Beginning from the front institutions, by roentgenological examination/inspection were revealed/detected in essence complications, also, first of all osteomyelitis; therefore in the group of injured people with osteomyelitis was conducted more than

investigations in the front and back institutions, than in the control room (90.6 and 87.7o/o). It is very important to note the considerable difference in the groups of injured people with osteomyelitis and without it, in which roentgenological examination/inspection was not conducted: with osteomyelitis - 9.1o/o, without osteomyelitis - 41.8o/o; into the latter/last group entered amputated, and also injured people, dead persons on DMP and in PPG.

In injured people with the heavy or firm course of osteomyelitis of the bones of shin was conducted bacteriological investigation of bone sequestrations and discharge from the wounds.

According to the data of the development of the histories of disease/sickness/illness/malady, bacteriological investigation was applied in 2.4o/o of injured people with bullet osteomyelitis of the bones of shin.

I. L. Glazer and the Irkutsk institute of epidemiology and microbiology produced bacteriological investigation in 251 injured people with bullet osteomyelitis of the bones of shin; in 73.0o/o of inspected injured people was found the mono-infection, and in 27.0o/o - poly-infection. Pathogenic anaerobes were not discovered not to time.

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The attempts to compare the severity of disease with the preponderance of one or the other form/species flora to nothing that determined did not lead. It is possible to only indicate that osteomyelitis with the monoinfection flowed/occurred/lasted more easily than with the poly-infection.

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Table 218. The distribution of injured people with the bullet break of the bones of shin, complicated by osteomyelitis and by not complicated by them, in the stages of evacuation, in which was produced the first roentgenological examination/inspection (in the percentages).

(1) Группа раненых	(2) Этап эвакуации	ДМП, ППГ и ЭГ армии (3)	(4) ЭГ фронт- та	(5) ЭГ тыла	(6) Всего	(7) Обследо- вания не проводилось
(8) С остеомиелитом		9,4	40,3	50,3	100,0	9,1
(9) Без остеомиелита		12,3	41,4	46,3	100,0	41,8

Key: (1). Group of injured people. (2). Stage of evacuation. (3). DMP, PPG and EG of army. (4). EG of front. (5). EG of rear. (6). In all. (7). Examinations/inspections was not conducted. (8). With osteomyelitis. (9). Without osteomyelitis.

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It is important to become acquainted with those complications which preceded or accompanied bullet osteomyelitis (table 219).

It is completely logical that among those wounded with osteomyelitis less it was complications shock, sepsis and anaerobic infection; such injured people lost their extremity part before was distinguished osteomyelitis; in this group of injured contractures it

was at the same time into two and the more of times more, and complications by urolithiasis - five times.

The complication of osteomyelitis narrowed the possibilities of warning/preventing of contracture and fight with it, in particular, by applying the therapeutic gymnastics. The complication of bullet breaks by urolithiasis, according to the data of authors' majority, occurred as a result of the infection of break.

The more rare complications of bullet osteomyelitis were parenchymatous hepatitis, nephrosis, glomerulonephritis and others.

Treatment.

According to the data of the development of the histories of disease/sickness/illness/malady, in 82.10/o of injured people with bullet osteomyelitis of the bones of shin was applied surgical treatment, and in remaining 17.90/o - conservative. As a result of this conservative treatment the recovery of osteomyelitis began in 9.30/o of all injured people with osteomyelitis.

Thus, almost 10.00/o of all injured people with osteomyelitis they cured without the operations/processes.

All injured people with bullet osteomyelitis of the bones of shin, in which was applied the operational method of treatment, were divided into two groups, depending on the character/nature of surgical intervention: one group composed the injured people, in whom were applied the operations/processes only on soft tissues (10.0o/o), another group - those, in which were conducted also the operations/processes on bones (72.1o/o); the overwhelming majority of injured people this had sequestrectomy (69.5o/o) and only in small percentage - resection of bone (3.3o/o).

The methods of treatment during the different years of war were dissimilar (table 220).

From 1941 through 1944 continuously was decreased a number of injured people with osteomyelitis, whose operation/process was not conducted at all or it was conducted only on the soft tissues, and continuously grew/rose a number of injured people during treatment of whom the operation/process was employed on the bone.

In 1945 again somewhat increased a number of injured people who were treated conservatively or with the aid of operation/process on the soft tissues. This is connected with the earlier extraction of injured people in connection with the termination of war.

Table 219. Frequency of complications, which were being observed in injured people with the bullet break of the bones of shin, complicated by osteomyelitis and by not complicated by them (in the percentages) .

(1) Группа раненых	(2) Осложнение	(3) Шок	(4) Инфекция			(8) Контрак- тура	(9) Уролито- зис
			(5) анаэроб- ная	(6) септи- ческая	(7) вуль- гарная		
(10) С остеомиелитом		2,0	3,4	1,2	100,0	67,3	0,2
(11) Без остеомиелита		8,6	14,9	2,8	23,5	31,8	0,04

Key: (1). Group of injured people. (2). Complication. (3). Shock. (4). Infection. (5). anaerobic. (6). septic. (7). vulgar. (8). Contracture. (9). Urolithiasis. (10). With osteomyelitis. (11). Without osteomyelitis.

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Indicators for 1943, 1944 and 1945 are very close between themselves, which indicates the stabilization of the methods of their treatment during the war.

For the treatment of osteomyelitis of the separate bones of shin different methods were applied not equally not frequently (table 221).

As one would expect, with osteomyelitis of fibular bone the operations/processes were conducted more rarely than with osteomyelitis of the tibia or both bones of shin simultaneously, since intoxication with isolated/insulated osteomyelitis of fibular bone was observed to a lesser degree than with osteomyelitis of tibial or simultaneously both bones.

The use/application of different methods for the treatment of bullet osteomyelitis of the bones of shin little depended on the form/species of break, which was complicated by osteomyelitis (table 222).

Osteomyelitis with the crushed and fragmented breaks flowed/occurred/lasted with the larger intoxication and it is firmer; therefore radical methods here were applied more frequently than with osteomyelitis, which complicated other forms/species of break, although the difference in the appropriate numerals was small (table 222).

Table 220. Methods of the treatment of bullet osteomyelitis of the bones of shin during the different years of war (in the percentages).

(1) Годы	(2) Метод лечения	(3) Только консерва- тивный	(4) Операция только на мягких тканях	(5) Операция на кости	(6) Всего
1941		38,6	19,3	42,1	100,0
1942		24,0	11,5	64,5	100,0
1943		14,7	8,6	76,7	100,0
1944		13,2	8,1	78,7	100,0
1945		15,1	10,2	74,7	100,0
(7) В среднем . . .		17,9	10,0	72,1	100,0

Key: (1). Years. (2). Method of treatment. (3). Only conservative.
 (4). Operation/process only on soft tissues. (5). Operation/process
 on bone. (6). In all. (7). On the average.

Table 221. Methods the treatment of bullet osteomyelitis of the separate bones of shin (in the percentages).

(1) Локализация остеомиелита	(2) Метод лечения	(3) Только консер- ватив- ный	(4) Операция только на мягких тканях	(5) Операция на кости	(6) Всего
(7) Малоберцовая кость		25,6	16,3	58,1	100,0
(8) Большеберцовая »		16,0	7,8	76,2	100,0
(9) Об: кости		15,4	10,7	73,9	100,0

Key: (1). Localization of osteomyelitis. (2). Method of treatment. (3). Only conservative. (4). Operation/process only on soft tissues. (5). Operation/process on bone. (6). In all. (7). Fibular bone. (8). Tibia. (9). Both bones.

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If we to the aforesaid about the methods of the treatment of bullet osteomyelitis of the bones of shin add that the percentage of the recovery of osteomyelitis (as the nearest issue) it was more during the use/application of the conservative method (see further), then it will become completely obvious, that all methods had right to the existence, and the use/application of that or different of them was conditioned on both the general state of organism of injured person and on form/species of osteomyelitis and on pattern of his flow. For example, quietly flowed/occurred/lasted osteoperiostitis

which, according to I. L. Glezer's data, were encountered in 40.00/o of injured people, in the general good state of injured person in many did not require operation/process.

Surgical treatment.

It is important, first of all, to explain, to what degree was increased the need in the surgical treatment in connection with the complication of the breaks of the bones of shin of osteomyelitis (table 223).

Prove to be that with the complication of osteomyelitis was expanded only the circle of those operated (almost 2 times - 82.1 and 43.60/o), but an average number of operations/processes to one that operated was almost identical (1.6 and 1.5).

Readings for the operation/process apropos of bullet osteomyelitis of the bones of shin were the same as with osteomyelitis of other bones (vol. 2).

Surgical treatment was conducted in all stages of evacuation, but the character/nature of operations/processes in different stages was dissimilar depending on the stage of the course of osteomyelitis (table 224). A quantity of surgical interventions also sharply was changed in stages. Thus, if in the army region operations/processes were conducted in 13.00/o of injured people with osteomyelitis, then in the front region they were produced in 24.50/o, and in the deep

rear - in 71.20/o.

Table 222. Methods of the treatment of bullet osteomyelitis of the bones of shin, which complicated the breaks of different type (in the percentages) .

(1) Вид перелома. осложнившегося остеомиелитом	(2) Метод лечения	(3) Только консерва- тивный	(4) Операция только на мягких тканях	(5) Операция на кости	(6) Всего
(7) Дырчатый и краевой		16,1	10,1	73,8	100,0
(8) Оскольчатый		13,3	8,5	78,2	100,0
(9) Раздробленный		12,5	6,6	80,9	100,0
(10) Прочие		16,1	11,5	72,4	100,0

Key: (1). Form/species of the break, which was complicated by osteomyelitis. (2). Method of treatment. (3). Only conservative. (4). Operation/process only on soft tissues. (5). Operation/process on bone. (6). In all. (7). Perforated and edge/boundary. (8). Fragmented. (9). Crushed. (10). Other.

Table 223. Distribution of injured people with bullet break of the bones of shin, complicated and not complicated osteomyelitis, according to a number of produced operations/processes, except the primary processing (in the percentages).

(1) Группа раненых	(2) Число операции							
	(3) Одна	(4) Две	(5) Три	(6) Четыре	(7) Пять и более	(8) Всего	(9) Среднее число операций на одного оперированного	(10) Всего оперировано
(11) С остеомиелитом	59,3	29,0	8,6	2,3	0,8	100,0	1,6	82,1
(12) Без остеомиелита	64,7	23,3	8,4	2,7	0,9	100,0	1,5	43,6

Key: (1). Group of injured people. (2). Number of operations/processes. (3). One. (4). Two. (5). Three. (6). Four. (7). Five and more. (8). In all. (9). Average number of operations/processes to one that operated. (10). In all it is operated. (11). With osteomyelitis. (12). Without osteomyelitis.

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Operations/processes in the army region carried in essence the character/nature of reworking - autopsy of suppurative flows, revision of wound and so forth; sequestrectomies in this stage composed only 4.40/o of all operations/processes. In the front region sequestrectomies were conducted already considerably more frequent (55.10/o), whereas secondary processing moved away in the second place.

In the administrative area were operated more than 2/3 all injured people, sequestrectomies composing almost 90.00/o of all operations/processes.

Scraping out by the sharp/acute spoon of fistula, and sometimes also to bone cavity with the removal/distance of encountered on the way sequestrations (curettage) is the manipulation, produced by blindly sharp/acute spoon. This method was of use only in injured people whose bone sequestrations were arranged/located in the soft tissues along the course of fistula. In the majority of injured

people this operation/process proved to be barely effective, and injured people due to the presence of sequestrations it was necessary to operate repeatedly. According to the data of the development of the histories of disease/sickness/illness/malady, curettage it did not have wide distribution (in Table 224 curettage it was shown in the graph/count "other").

Besides the small effectiveness of this method and presence of a considerable quantity of relapses, curettage with its entire simplicity it gave sometimes serious complications. I. L. Glezer observed in 4 injured people after scraping out with osteomyelitis of metaphyses of both bones of shin hemorrhage.

Operations/processes on the bone on the years of war were conducted not only more frequently, but also within the earlier periods (Table 225).

Table 224. Distribution of injured people with bullet osteomyelitis of the bones of shin according to the character/nature of the operations/processes, produced in the different regions (in the percentages).

(1) Район	(2) Название операции	(3) Вторич- ная обра- ботка раны	(4) Вскры- тие гной- ных за- тесов	(5) Ампута- ция	(6) Семистр- эктомия	(7) Прочие	(8) Итого
Армейский . (9)	54,9	34,4	2,6	4,4	3,7	100,0
Фронтальной . (10)	19,0	20,8	1,7	55,1	3,4	100,0
Тыловой . . (11)	2,8	3,3	0,4	89,1	4,4	100,0

Key: (1). Region. (2). Name of operation/process. (3). Reworking of wound. (4). Autopsy of suppurative flows. (5). Amputation. (6). sequestrectomy. (7). Other. (8). Altogether. (9). Army. (10). Front. (11). Back.

Table 225. Periods after injury to first sequestrectomies with bullet osteomyelitis the bones of shin in the different years of the war (in the percentages).

(1) Годы	(2) Срок (в меся- цах)	1	2	3	4	5	6	(3) 7 и более	(4) Всего
1941	5,6	15,5	14,2	18,2	15,5	15,5	15,5	100,0
1942	8,3	23,7	28,5	19,5	12,8	3,2	4,0	100,0
1943	13,0	24,6	28,7	18,5	9,0	4,1	4,1	100,0
1944	16,8	37,6	25,3	11,1	3,9	3,5	1,8	100,0
1945	19,7	37,8	27,1	11,3	1,7	2,4	—	100,0
(5) В среднем . . .		13,9	29,6	26,2	15,5	7,5	4,0	3,3	100,0

Key: (1). Years. (2). period (in months). (3). and more. (4). In all.

(5). On the average.

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In 1941 in the first two months after the injury sequestrectomy it was conducted more than $2 \frac{1}{2}$ times thinner/less frequent (21.10/o) than into 1945 (57.50/o). The shortening of period from the moment/torque of injury to first sequestrectomies was very considerable as long ago as 1942, and then continuously it grew on during the entire war.

With isolated/insulated osteomyelitis of the fibular and tibia sequestrectomy it was applied within the earlier periods than with osteomyelitis of the simultaneously both bones of shin (Table 226).

In the first two months after the injury sequestrectomy it was conducted almost equally frequently with osteomyelitis of fibular (46.90/o) and tibia (45.50/o) and it is considerably more frequently than with osteomyelitis of both bones simultaneously (36.10/o).

Delay in the production of sequestrectomy with osteomyelitis of both bones is explained by the more difficult diagnosis of osteomyelitis and by the more complex character/nature of operation/process in these injured people.

The difficulty of the recovery of osteomyelitis was revealed/detected already in the first months after its onset; therefore to the extraction from the hospital in 15.50/o of injured people it was necessary to produce repeated sequestrectomy. Most rarely repeated sequestrectomies were made with osteomyelitis of fibular bone (8.30/o) and it is more frequent - with osteomyelitis of both bones (17.00/o).

The frequency of repeated sequestrectomies on the years of war changed very little, and consequently, the earlier production of sequestrectomies with the course of war did not decrease need in repeated sequestrectomies. It cannot be considered that the need in them was always caused by the insufficient radicality of operations/processes, since were known the relapses of osteomyelitis after quite radical surgery - cross resection. Evidently, this it is necessary to explain by the special complexity of process, which depends on the deficiency of the reparative function of the organism of injured person, to the virulence of infection, etc.

It is necessary to say that do such injured people have, in spite of repeated sequestrectomy, percentage of the recovery of osteomyelitis it was below (42.4), than in injured people, who were

subjected to single sequestrectomy (52.4).

In 16.30/o of injured people who underwent sequestrectomy, to it no operations/processes it was conducted, while in 83.70/o of injured people sequestrectomies preceded different surgical interventions (Table 227).

Table 226. Periods after injury to first sequestrectomies with bullet osteomyelitis of the separate bones of shin (in the percentages).

(1) Локализация остеомиелита	(2) Срок (в месяцах)						(3) 7 и более	(4) Всего
	1	2	3	4	5	6		
Малоберцовая кость (5) . . .	14,0	32,9	24,7	11,1	9,2	3,3	4,8	100,0
Большеберцовая кость (6) . . .	14,3	31,2	25,3	16,2	6,7	4,0	2,3	100,0
Обе кости (7) . . .	12,1	24,0	29,9	16,2	8,7	4,1	5,0	100,0

Key: (1). Localization of osteomyelitis. (2). Period (in months).

(3). and more. (4). In all. (5). Fibular bone. (6). Tibia. (7). Both bones.

Table 227. Operations/processes, which preceded first sequestrectomies or resection with bullet osteomyelitis of the bones of shin during the different years of war (in the percentages).

(1) Годы	(2) Характер операции	(3) Первичная хирургиче- ская обра- ботка	(4) Другие операции	(5) Первичная хирургиче- ская обра- ботка и дру- гие операции	(6) Операции не прово- дилось	(7) Всего
1941		32,4	10,8	14,8	42,0	100,0
1942		51,4	6,0	17,3	25,3	100,0
1943		61,6	3,6	14,0	20,8	100,0
1944		69,2	3,3	19,4	8,1	100,0
1945		69,4	1,5	20,0	9,1	100,0
В среднем (8)		59,8	5,2	18,7	16,3	100,0

Key: (1). Years. (2). Character/nature of operation/process. (3).

Primary surgical processing. (4). Other operations/processes. (5).

Primary surgical processing and other operations/processes. (6).

Operations/processes it was not conducted. (7). In all. (8). On the average.

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The operation/process, which preceded sequestrectomies, in essence was the primary surgical processing whose specific gravity/weight within the time of war increased almost 2 times (47.20/o in 1941 and 89.40/o in 1945). The more frequent use/application of primary surgical processing brought to the sharp contraction/abbreviation (almost 5 times) of the number of injured people which sequestrectomy had the first operation/process (in 1941 - 42.00/o, and in 1945 - 9.10/o).

In spite of so sharp an increase in the frequency of the use/application of primary surgical processing, necessity for other operations/processes, which preceded sequestrectomy within the time of war decreased only insignificantly (from 25.60/o in 1941 to 21.50/o in 1945), moreover decrease cannot be related by whole because the primary surgical processing was adopted more frequently, since from year to year sequestrectomy it was conducted within the earlier periods (Table 225).

A number of made to sequestrectomy operations/processes and

their character/nature differed little between themselves with osteomyelitis of the separate bones of shin or both bones simultaneously.

The method of the subperiosteal resection of wide distribution did not obtain (3.3c/o). In comparison with sequestrectomy the results of resection with bullet osteomyelitis of the bones of shin in the relation to the liquidation of osteomyelitis were somewhat best, whereas in the relation to false joints they were considerably more badly.

Thus, best method of the surgical treatment of osteomyelitis of the bones of shin was only the radical sequestrectomy.

Operative accesses. The tibia is available for entire elongation/extent on its front/leading crest/peak and internal face; therefore the exposure of its special difficulties does not present. Section/cut is conducted lengthwise with respect to crest/peak, at a distance from it towards the outside on 1-1.5 cm. The exposure of fibular bone is considerably more complex. For the exposure of entire fibular bone the section/cut is begun on the thigh on 5-6 cm higher than head of fibular bone and conduct with respect to posterior edge the tendons of biceps to its fastening to the head of fibular bone, whence section/cut at the obtuse angle turn they downward and

continue with respect to the posterior edge of fibular bone to the head the ankles/malleoli. Abstracting/removing by correspondingly of muscle and secreting on entire way the fibular nerve which in the region of the head of fibular bone is divided into a deep and surface branch, they uncover fibular bone for entire its elongation/extent.

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If necessary to spread wound or to make a supplementary section/cut for the purpose of the disclosure/expansion of suppurative flows, removal/distance of foreign bodies and sequestrations from the soft tissues, the wide trepanation of bone should be been guided the descriptions (Vol. 15, pg. 455, etc.) of fascial spaces and the projection of basic vessels and nerves.

Conservative treatment.

Although with the years of war a number of injured people with osteomyelitis of the bones of shin, treated only is conservative, it was shortened more than 2 times, nevertheless and into 1945 number of such injured people it was considerable (15.10/o). It is known that the lighter course of osteomyelitis was observed more frequently with the simple breaks of bones, by especially fibular; actually/really, among the injured people, treated only conservatively, somewhat more

frequently were encountered simple breaks and besides fibular bone (1 1/2 times), which gave the possibility to be restricted to the use/application of some conservative methods, without resorting to operations/processes.

Recovery from the use/application only of conservative methods most frequently was observed in injured people whose osteomyelitis complicated perforated and edge/boundary break (63.5o/o), it is thinner/less frequent with fragmented break (52.6%) and most rarely with that crushed (41.6o/o). However, a number of patients during the use/application different methods on the average was almost equal.

Thus, it cannot be said that the conservative methods of treatment gave good results exclusively with osteomyelitis which was observed with the edge/boundary and perforated break.

One surgical treatment without the conservative methods not at all was applied. This conservative method as, for example, therapeutic immobilization, they put to use during the treatment of all injured people with osteomyelitis.

The timely use/application of a good therapeutic immobilization for warning/preventing of onset and development of bullet osteomyelitis, and also after operation/process for the treatment of